IN THE UNITED STATES DISTRICT COURT

DISTRICT OF MINNESOTA

IN RE PORK ANTITRUST LITIGATION	No. 0:18-cv-01776-JRT-HB
This Document Relates To: ALL DIRECT PURCHASER PLAINTIFF ACTIONS	

EXPERT REPORT

of

Russell W. Mangum III, Ph.D.

Regarding Class Certification

FILED UNDER SEAL

TABLE OF CONTENTS

TABLES AND FIGURES

I. INTRODUCTION

A. My Education, Experience, and Qualifications

1. I am the Executive Vice President at Cirque Analytics LLC ("Cirque Analytics"). Cirque Analytics is an economic consulting firm that provides economic, financial, and statistical research and analysis to private and public sector clients. I am also a Professor at Concordia University Irvine, School of Business and Economics.

2. I hold a Ph.D. and a M.A. in economics from the University of Southern California, and a B.A. in economics, with honors, from California State University, Fullerton. I have been using econometrics and economic analysis to evaluate and model the effects of anticompetitive behavior for over 25 years. From 1995 to 1998, I served as a staff economist at the United States Federal Trade Commission, in the Antitrust Division of the Bureau of Economics. While at the FTC, I conducted economic investigations into proposed mergers and other business practices with potentially anticompetitive effects, including investigations into coordinated interactions, boycotts, and price fixing. From 1998 through 2001, I was an economist at Nathan Associates (my first tenure at Nathan Associates), where I served as a consulting and testifying economist on various litigation assignments, including antitrust and class action antitrust matters. From 2001 through 2007, I was an economist at PricewaterhouseCoopers and Analysis Group Inc., where I acted as a consulting and testifying economist on various litigation matters, including those related to commercial disputes, alleged intellectual property infringement, and alleged antitrust violations. From 2007 to 2021, I served as an economist and firm officer at Nathan Associates (my second tenure at Nathan Associates), where I acted as a consulting and testifying economist on various litigation matters, including those related to alleged antitrust violations, commercial disputes, and alleged intellectual property infringement. In April 2021, I moved into my current role at Cirque Analytics.

3. I am or have been a member of several professional associations, including the American Economic Association, the Intellectual Property Law Association, and the American Bar Association, and I have served as the Chair of the Orange County chapter of the Licensing Executives Society. I have taught courses in undergraduate and graduate economics and econometrics at Johns Hopkins University, the University of Southern California, Pepperdine University, and Concordia University Irvine.

4. My experience in economic analysis includes evaluation of the potentially anticompetitive effects of business conduct, including the measurement of the effects of such conduct. In conducting such analyses, I have often analyzed numerous relevant markets (both geographic and product markets), barriers to entry, market power, and monopolization. I have used databases related to purchase transactions, invoices, and company financial performance to specify econometric models of pricing and costs, and to estimate the impacts of business combinations and cartel behavior on both direct and indirect purchasers.

5. Cirque Analytics currently charges its usual and customary rate of $700 per hour for my work in this matter. Professional staff members employed by Cirque Analytics also assist me. Neither my compensation nor that of Cirque Analytics is contingent upon the outcome of this case.

6. My curriculum vitae is attached to this declaration as **Appendix A**. Also included in **Appendix A** is a list of the matters in which I have testified in the past four years, along with a list of my publications for at least the past ten years.

B. Plaintiff Allegations and Class Definition

7. In their Third Amended and Consolidated Class Action Complaint (dated January 15, 2020) (the "Complaint"), direct purchaser plaintiffs allege that Defendants and co-conspirators engaged in a conspiracy to fix, raise, maintain, and/or stabilize the price of pork.

8. Terms like "pig," "hog," and "pork," are used throughout this report, as are terms like "grower," "packer," "producer," and "farmer." Depending on the context, many of these terms could be used interchangeably. However, for the sake of clarity in this report, I have adopted the following terminology:

- The terms "hogs," "pigs," and "piglets" all refer to swine that are raised commercially for meat.
    i. The term "hog" (or "market hog") is used to refer to pigs that have reached slaughter-appropriate (or "market-ready") size.
    ii. The term "pig" may refer to swine of any type, but generally throughout this report is used when speaking about swine animals more broadly, or to denote swine that are not yet market-ready (i.e., they are not yet market hogs).
    iii. The term "piglet" refers to young swine that are not yet market-ready.

- The term "pork" is used to refer to the products derived from the slaughter and processing of market hogs.
- The terms "grower" and "farmer" refer to entities (or individuals) that raise swine.
- The terms "packer" and "producer" refer to entities that slaughter and produce pork for commercial sale, such as Defendants (other than Agri Stats).

9. For clarity, I use the terms "grower" and "packer" (rather than "farmer" or "producer") except where documents or context preclude it. I also note that growers and packers are not mutually exclusive—indeed, all Defendants in this case are both growers and packers.

10. Broadly speaking, the products at issue in this case include fresh or frozen cuts of pork and uncooked bacon. Thus, pork that has been ground, cooked, smoked, marinated, breaded, or otherwise flavored (other than bacon),[1] or has been mechanically separated, such as pork sausages or lunchmeat, are not included in the relevant product definition and have been excluded from my analysis. Additionally, I have excluded from my analysis certain other pork products, such as offal, fat, hocks, ears, snouts, various trimmings, and other fringe products.[2] With these exceptions, the DPP Class,[3] as set forth in the corresponding motion for class certification and herein, is defined as:

> All persons and entities who directly purchased one or more of the following types of pork, or products derived from the following types of pork, from Defendants, or their respective subsidiaries or affiliates, for use or delivery in the United States from June 29, 2014 through June 30, 2018: fresh or frozen loins, shoulders, ribs, bellies, bacon, or hams. For this lawsuit, pork excludes any product that is marketed as organic or as no antibiotics ever (NAE); any product that is fully cooked or breaded; any product other than bacon that is marinated, flavored, cured, or smoked; and ready-to-eat bacon.[4]

---

[1] In other words, cured bacon is part of my analysis in this case, but fully-cooked (or "ready-to-eat") bacon is not. No other cooked or smoked products are intended to be in the class definition or my analysis.

[2] The backup materials produced in connection with this report include details on all products that are included or excluded from the analysis. It is not my opinion that pork products excluded from those in the class definition were unaffected by the alleged conspiracy. Rather, they are outside the scope of my analysis, largely due to data availability.

[3] There are currently four named direct purchaser plaintiffs in the litigation: Maplevale Farms, Inc., John Gross and Company, Inc.; Ferraro Foods, Inc., and Ferraro Foods of North Carolina, LLC (collectively "Ferraro Foods"), and Olean Wholesale Grocery Cooperative, Inc. Complaint, ¶¶ 14–19. I refer to these named plaintiffs as well as the class of direct purchasers that they represent collectively as the DPPs.

[4] Specifically excluded from this Class are the Defendants, the officers, directors or employees of any Defendant; any entity in which any Defendant has a controlling interest; and any affiliate, legal representative, heir or assign of any Defendant. Also excluded from this Class are any federal, state or local governmental entities, any judicial

11. While the results of my analysis relate to products at issue for the DPP Class ("Class Products"), my discussion of the pork market itself is not so limited. For example, my discussion of Defendants' market power does not depend on the particular Class definition or Class Products in this case. Similarly, many industry and Defendant documents I have reviewed and rely on discuss "pork" in ways that may include products like smoked ham, sausage, trimmings, and other pork products that fall outside the Class definition. Further, while much of my analysis uses data limited to just Class Products, I have also conducted certain analyses that focus on the overall pork industry and use data from sources (such as the US Department of Agriculture ("USDA")) that necessarily includes both Class and non-Class Products.

12. The Class Period defined above does not correspond to the wrongdoing alleged by Plaintiffs. Specifically, Plaintiffs allege that the conspiracy began at least as early as January 2009, but they are limited by statute to only seeking damages on purchases on or after June 29, 2014.[5] For the sake of clarity, I refer to the broader period of January 1, 2009 – June 30, 2018 as the "Conspiracy Period," and June 29, 2014 – June 30, 2018 as the "Class Period." I note that it is not my opinion that the alleged conspiracy necessarily ended by June 30, 2018. However, I understand that full discovery after that date is not available. Accordingly, Counsel for DPPs requested that I analyze overcharges only through the Class Period.

13. According to the Complaint, Defendants used a variety of methods to effectuate the alleged conspiracy, including a) restricting the domestic supply of pork by, i) coordinating their output, ii) limiting production, and iii) increasing exports, and b) exchanging detailed, non-public information about prices, bids, capacity, sales volume and demand, including through Defendant Agri Stats.[6]

---

officer presiding over this action and the members of his/her immediate family and judicial staff, any juror assigned to this action, and any Co-Conspirator identified in this action.

[5] *See* Memorandum and Order, Oct. 16, 2020 (Doc. 519). I explain the Conspiracy Period timeframe in more detail in **Section V. C.** below. I understand that, based on this order, damages are limited to a period of four years from the filing of the DPP Complaint, which was on June 29, 2018.

[6] Agri Stats is a data collection and analysis company that collects confidential data from subscribers like Defendants (and others), which it then uses to compile industry benchmarking reports, which are sent to subscribers on a weekly and monthly basis.

C. Assignment

14. I have been retained by Counsel for the DPPs to undertake the following tasks:

- Analyze whether the pork industry in the United States had structural characteristics over the relevant timeframe that economic theory would suggest made it conducive to the formation and success of the alleged conspiracy.
- Determine whether there is common evidence demonstrating that all, or nearly all, DPPs were impacted by the alleged conspiracy.
- Specify a methodology (or methodologies) by which any Class-wide damages that may have resulted from the alleged conspiracy can be accurately determined.

D. Information and Materials Relied Upon

15. In preparing this report, I (and those working under my direction) relied on numerous common sources of data and information concerning the pork industry, including:

- The Complaint and other documents filed with the Court;
- Voluminous data and documents produced by Defendant packers, including transaction data and internal business records; [7]
- Data and documents produced by Defendant Agri Stats;[8]
- Publicly available data and information, including data from the USDA;
- Transcripts of the deposition testimony of a number of witnesses; and
- Economic and industry research.

16. A list of the materials I relied upon in forming my opinions is provided in **Appendix B** to this report, or elsewhere in this report. The conclusions reached in this report are based on the information and data that have been reviewed to date. In the event that additional data or information becomes available, whether through discovery or other sources, I reserve the right to update my analysis and conclusions appropriately.

E. Summary of Conclusions

17. Based on my analysis of the record to date, including evidence, statistical and econometric modeling, and analyses that are common to the Class, I have concluded that:

---

[7] The transaction data produced by Defendants were compiled and cleaned by the consulting firm OSKR. The staff working under my direction reviewed the data cleaning computer programs that OSKR provided.

[8] The data produced by Agri Stats were compiled and cleaned by the consulting firm OSKR. The staff working under my direction reviewed the data cleaning computer programs that OSKR provided.

- The structure of the pork packing market was conducive to the formation and success of the alleged conspiracy. This flows from numerous facts, including:
    i. Defendants collectively dominate the pork packing market, with their joint market share ranging between 80% and 90% throughout the relevant time period. By controlling such a large share of the market, Defendants possessed the ability to control both supply and price for pork products.
    ii. There are relatively few large pork packers in the United States, which makes coordination and enforcement of a conspiracy easier and more likely to succeed.
    iii. The highly concentrated nature of the pork market, combined with Defendants' participation in numerous trade organizations, leads to an environment in which numerous executives and other key personnel had numerous opportunities to communicate with each other.
    iv. There were significant barriers to entry in the pork packing market throughout the relevant time period. Other things equal, such barriers would have facilitated the formation, maintenance, and success of the alleged conspiracy.
    v. Pork industry participants, including analysts, purchasers, and Defendants themselves, recognized that pork products are commodity products. As cartels are more likely to form where the products sold by would-be competitors are homogeneous or commodity-like, the commodity-like nature of pork products would have also facilitated the formation and success of the alleged conspiracy.
    vi. Defendants belong to and participate in numerous trade organizations, which could provide opportunities for supposed competitors to meet under legitimate-appearing circumstances, during which they could engage in discussions that furthered the alleged conspiracy.
- The results of my econometric analysis, which shows artificially inflated prices during the relevant time period, is consistent with the existence of the alleged conspiracy.
    i. Econometric analysis of Defendants' transactional sales data shows that prices were higher during the Conspiracy Period than non-conspiratorial supply and demand factors would have predicted.
    ii. Application of the estimated overcharges to individual DPPs suggests that all (or virtually all) DPPs were impacted.
- Common evidence demonstrates that all, or nearly all, members of the DPP Class paid artificially inflated prices on purchases of pork products.

i. As a result of the structure and characteristics of the pork industry, DPPs would have had very limited, if any, ability to avoid price impacts from the alleged conspiracy. In particular, because of these structural characteristics, the ability to buy pork from alternative sellers or switch to alternative products to avoid price impacts would be very limited, if any.

ii. Analysis of Defendants' sales records shows a high degree of similarity in prices across several relevant economic dimensions.

iii. The widespread use of market benchmarks such as the USDA pork cutout limited the ability of DPPs to avoid the impact of reduced pork supplies.

iv. As a matter of economics, reducing or restricting the supply of pork has the effect of raising prices. Following from that, economic theory regarding the nature of the alleged conspiracy, i.e., collusive supply reductions removed pork supply from the entire market, would lead to increased prices to all DPPs.

- There are feasible and reliable methods to measure Class-wide impact and damages on a common, formulaic basis.

  i. Using regression analysis, I have calculated the amount by which Class members during the Class Period were overcharged as

     1. 13.9% on bacon;
     2. 19.1% on belly;
     3. 4.7% on fresh ham;
     4. 4.3% on loins;
     5. 8.0% on ribs; and
     6. 11.5% on shoulders.

  ii. I have estimated the relevant Class commerce to be $51,378,285,595 and Class-wide damages during the Class Period to be just over $5 billion.

F. Defendants and Co-Conspirators

18. The following section gives only a brief overview of the parties to this case. Later sections of this report present additional details about these entities as they relate to specific areas of analysis or study.

1. Defendants

Agri Stats[9]

19. Agri Stats, located in Fort Wayne, Indiana, provides detailed performance analysis and benchmarking services to pork packers within the United States. The company collects comprehensive financial and operational statistics related to production activities from pork industry participants, and compiles that information in weekly and monthly performance and benchmark reports for its subscribers. In connection with the reports it provides to its subscribers, Agri Stats includes insightful clues that are designed to help its subscribers make informed production decisions, including opportunities to increase prices and earn more profits.[10] More specifically, the reports compare each subscriber's performance with that of other pork packers. Plaintiffs have alleged that Defendants were able to de-anonymize the reports to identify their competitors, therefore gaining detailed information about competitors' operations and financial performance.[11]

Clemens/Hatfield Quality Meats[12]

20. Clemens Food Group ("Clemens"), based in Hatfield, Pennsylvania, is a privately held corporation that manufactures and distributes pork products. Clemens describes itself as "a vertically coordinated company that includes hog farming, food production, and transportation."[13] Originally named Hatfield Quality Meats, around 2010, the company was renamed Clemens Food Group, though Hatfield has remained the flagship Clemens brand.[14]

Hormel[15]

21. Hormel Foods, LLC ("Hormel"), headquartered in Austin, Minnesota, is a wholly owned subsidiary of Hormel Foods Corporation. Formally known as Geo. A. Hormel & Company,

---

[9] Complaint, ¶ 20.

[10] I discuss examples of the type of information Agri Stats provided to Defendants in Section III. A. 5. a.

[11] Complaint, ¶¶ 60–64.

[12] Complaint, ¶¶ 21–22.

[13] Clemens Food Group, "Vertically Coordinated," accessed Mar 29, 2022, https://clemensfoodgroup.com/our-company/vertically-coordinated.

[14] Hatfield, "Our Family," accessed Dec. 22, 2021, https://simplyhatfield.com/our-family; Hatfield, "Our Pledge," accessed Dec. 22, 2021, https://simplyhatfield.com/our-pledge.

[15] Complaint, ¶¶ 23–24.

Hormel was founded in 1891, and sells pork products across all 50 states, by and through the operation of 12 major plants.[16]

JBS[17]

22. JBS USA Food Company ("JBS"), is a subsidiary of JBS USA Food Company Holdings, which is itself a subsidiary of JBS S.A., a Brazilian firm that is the largest meat processing company in the world.[18] I understand that JBS entered the U.S. pork industry through its acquisition of Swift & Company in 2007.[19]

23. In 2015, JBS further strengthened its position in the U.S. pork industry by purchasing Cargill's pork processing business.[20] JBS describes itself as a "global, diversified protein company" that serves "customers and consumers around the world."[21] JBS claims to be the largest global producer of both beef and poultry, and the second largest global producer of pork.[22] JBS sells pork products under a variety of brand names, including Swift® and Plumrose®.[23]

Smithfield[24]

24. Smithfield Foods ("Smithfield"), founded in 1936, is a pork packer and food processing company headquartered in Smithfield, Virginia. The company has operations in 35 U.S. states and is a wholly owned subsidiary of WH Group Limited of China. Smithfield's pork segment consists of three wholly owned U.S. fresh pork and packaged meat subdivisions: the Smithfield Packing Company, Inc.; Farmland Foods, Inc.; and John Morrell Food Group. Smithfield also has a hog production segment, which consists of Smithfield's U.S. hog production

---

[16] Hormel, "Citizenship Overview 2006," *available at* https://www.hormelfoods.com/wp-content/uploads/Citizenship_Overview.pdf.

[17] Complaint, ¶ 26.

[18] Shefali Sharma, "Companies: Dominating the Market from Farm to Display case," Heinrich Boll Stiftung, Sept. 7, 2021, https://eu.boell.org/en/2021/09/07/companies-dominating-market-farm-display-case.

[19] JBS, "History," accessed Feb. 9, 2022, https://ri.jbs.com.br/en/jbs/history/; Zippia, "JBS USA Company History Timeline," accessed Feb. 9, 2022, https://www.zippia.com/jbs-usa-careers-28000/history/.

[20] Zippia, "JBS USA Company History Timeline," accessed Feb. 9, 2022, https://www.zippia.com/jbs-usa-careers-28000/history/.

[21] JBS, "Our Business," accessed Dec. 30, 2021, https://jbsfoodsgroup.com/our-business.

[22] *Id.*

[23] JBS, "Our Brands," accessed Dec. 30, 2021, https://jbsfoodsgroup.com/our-brands.

[24] Complaint, ¶ 29.

operations.[25] Smithfield's purchase of Murphy Farms in 2000 made it the leading hog grower in the world.[26] Smithfield brands include Smithfield, Eckrich, Nathan's Famous, Farmer John, Carando Classic Italian, Cook's Ham, John Morrell, and Curly's.[27]

Tyson[28]

25. There are three Tyson-related entities named in the Complaint—Tyson Foods, Inc. ("Tyson Foods"), Tyson Prepared Foods, Inc. ("TPF"), and Tyson Fresh Meats, Inc ("TFM").[29] I understand that TPF and TFM are wholly owned subsidiaries of Tyson Foods.[30] Unless otherwise specified, I refer to these three entities collectively as "Tyson" in this report.

26. Tyson has long been one of the largest processors of proteins in the United States. The company began operations in the 1930s and underwent a number of expansions and changes over time, including becoming publicly traded in 1963.[31] After extending its reach into international markets during the 1980s and 1990s, Tyson acquired IBP, Inc. (Iowa Beef Processors) in 2001, and became "the world's largest processor and marketer of chicken, beef, and pork."[32] According to Tyson's website, "1 in 5 pounds of chicken, beef, & pork in the U.S. is produced by Tyson Foods."[33] In addition, Tyson indicates that, as of fiscal 2020, a) pork comprises about 10% of the company's $43.2 billion in revenues, and b) the company operates seven pork processing facilities with the capacity to handle 461,000 head per week.[34]

---

[25] Forbes, "Smithfield Foods" *Forbes,* accessed Dec. 22, 2021, https://www forbes.com/companies/smithfield-foods/?sh=28fbe0281a8b.

[26] Virginian-Pilot, "Timeline | The history of Smithfield Foods," *Virginian-Pilot,* accessed Dec. 22, 2021, https://www.pilotonline.com/business/article_a2a34b25-aeb2-5d29-ab26-54094bb62bfd.html.

[27] Smithfield, "Our Brands," accessed Dec. 23, 2021, https://www.smithfieldfoods.com/our-brands.

[28] Complaint, ¶¶ 31–33.

[29] Complaint, ¶ 2.

[30] SEC, "Tyson Foods, Inc. All Legal Operating Entities and Subsidiaries," accessed Feb. 14, 2022, https://www.sec.gov/Archives/edgar/data/100493/000010049303000064/exhibit_211.htm

[31] Tyson, "Our History," accessed Dec. 30, 2021, https://www.tysonfoods.com/who-we-are/our-story/where-we-came-from/our-history.

[32] *Id.*

[33] Tyson, "Our Story," accessed Dec. 30, 2021, https://www.tysonfoods.com/who-we-are/our-story.

[34] Tyson, "Tyson Foods Facts," accessed Dec. 30, 2021, https://ir.tyson.com/about-tyson/facts/default.aspx.

27. Tyson claims ownership of "one of the largest and most robust protein portfolios in the food industry."[35] In addition to products sold under the Tyson name, Tyson's brands include Hillshire Farm®, Jimmy Dean®, Aidell's®, BallPark®, State Fair®, and others.[36]

Seaboard[37]

28. Seaboard Foods ("Seaboard"), begun as Seaboard Farms in 1990, is a wholly owned subsidiary of Seaboard Corporation.[38] Today, Seaboard is the second largest hog grower and fourth leading pork processor in the United States, with 7.2 million market hogs produced annually and 1.4 billion pounds of pork processed at its headquarters in Guymon, Oklahoma.[39] Seaboard sells all of the pork produced by Triumph's packing facility as part of a 2004 marketing agreement, and is also a 50% owner (with Triumph) of Seaboard-Triumph Foods ("STF").[40]

Triumph[41]

29. Triumph Foods ("Triumph") was organized in 2003 by the largest group of independent hog growers in the United States.[42] As of 2004 (when it entered its marketing agreement with Seaboard), Triumph's members included (among others) Allied Producers' Cooperative, Christensen Farms Midwest, LLC ("Christensen"), TriOak Foods, Inc., Eichelberger Farms, Inc., Ewington Farms, LLP, The Hanor Company of Wisconsin, LLC ("Hanor"), and New Fashion Pork, LLP ("New Fashion").[43] According to industry publication *Pork Powerhouses,*

---

35 Tyson, "Our Brands," accessed Dec. 30, 2021, https://www.tysonfoods.com/our-brands.

36 *Id.*

37 Complaint, ¶¶ 27–28.

38 Seaboard, "Our Companies," accessed Dec. 23, 2021, https://seaboardtriumphfoods.com/our-story.

39 Seaboard, "Facts and Figures," accessed Dec. 23, 2021, https://www.seaboardfoods.com/facts-figures/.

40 Seaboard Triumph Marketing Agreement, Feb. 2, 2004, and Second Amendment, May 13, 2015 (SBF0054466–580); Seaboard, "Our Companies," accessed Dec. 23, 2021, https://seaboardtriumphfoods.com/our-story.

41 Complaint, ¶ 30.

42 Seaboard, "Our Companies," accessed Dec. 23, 2021, https://seaboardtriumphfoods.com/our-story. The 2004 marketing agreement between Seaboard and Triumph lists a number of signatories as members of Triumph Foods. SBF0054466–580.

43 Although Christensen Farms is not listed as an original signatory on the 2004 agreement, the 2004 edition of industry publication *Pork Powerhouses* states that Christensen Farms is a "shareholder in Triumph Foods," and it is a signatory on the 2015 amendment. I understand that NFP West RLLP refers to New Fashion Pork. *See* SBF0054466–580; Betsy Freese, "Power Powerhouses 2004: Pigs, Pigs, and More Pigs," Successful Farming, Oct. 1, 2004, *available at* https://www.agriculture.com/livestock/pork-powerhouses/pork-powerhouses-2004-pigs-pigs-and-more-pigs; Betsy Freese, "2004 Pork Powerhouses," *Successful Farming,* 2004, *available at* https://www.agriculture.com/system/files/PorkPowerhouses_2004_0.pdf.

Christensen and Hanor controlled the fourth and tenth largest sow herds in the country, while New Fashion was the 18th largest in 2004.[44] Triumph began processing operations in St. Joseph, Missouri in 2006. Triumph is regarded as a leader in pork processing, with over 6 million hogs produced each year, and $1.6 billion in annual revenues.[45] Triumph and Seaboard are co-parents of STF.

Seaboard and Triumph's Joint Venture - Seaboard-Triumph Foods

30. STF is the result of a May 2015 joint venture between Seaboard and Triumph, in which both companies hold a 50% share.[46] The company opened a packing facility in Sioux City, Iowa in 2017.[47] As a combined entity, Seaboard, Triumph, and STF raise the second-most hogs in the United States, and are among the top five pork packers.

2. Non-Defendant Co-Conspirator Indiana Packers[48]

31. Indiana Packers Corporation ("Indiana Packers") is headquartered in Delphi, Indiana. The company identifies as "the [pork] industry's only high-volume, fully integrated food supplier" that operates entirely from one Midwest location.[49] Indiana Packers is the maker of a handful of brands, including Fischer's, Indiana Kitchen, and Kentuckian Gold.[50] It is my understanding that Indiana Packers has been dismissed from this litigation.[51]

---

[44] Betsy Freese, "2004 Pork Powerhouses," *Successful Farming,* 2004, *available at* https://www.agriculture.com/system/files/PorkPowerhouses_2004_0.pdf.

[45] Triumph, "Triumph's Story," accessed Dec. 23, 2021, https://www.triumphfoods.com/triumphs-story/.

[46] Seaboard, "Our Companies," accessed Dec. 23, 2021, https://seaboardtriumphfoods.com/about-us; Second Amendment to the Seaboard Triumph Marketing Agreement, May 13, 2015 (SBF0054466–580).

[47] STF, "Who We Are," accessed Apr. 7, 2022, https://seaboardtriumphfoods.com/who-we-are.

[48] Complaint, ¶ 25; Amended Memorandum and Opinion and Order, Oct. 20, 2020 (Doc. 520), pp. 86–87.

[49] Indiana Packers Corporation, "Message from the President," accessed Dec. 23, 2021, https://indianapackerscorp.com/company/message-from-president/.

[50] Indiana Packers Corporation "Our Beloved Brands," accessed Dec. 23, 2021, https://indianapackerscorp.com/company/brands/.

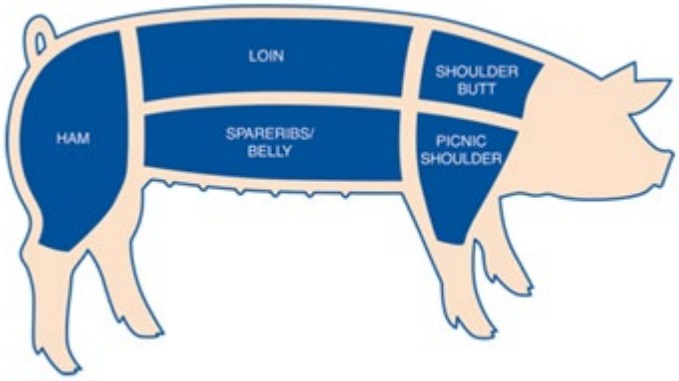
[51] Amended Memorandum and Opinion and Order, Oct. 20, 2020 (Doc. 520), pp. 86–87.

II. INDUSTRY BACKGROUND

A. Pork Products

32. According to the USDA, as well as Defendants' documents, there are a limited number of basic or "primal" cuts of pork: the shoulder, loin, belly (or side) and ham (or leg).[52] These primal or "wholesale" cuts can then be further split into any number of "sub-primal" (or "retail") cuts.[53] For example, shoulders are cut into (among other products) picnics, Boston butts, and blades; common sub-primal loin cuts include tenderloins, sirloin, top loin, and back ribs (i.e., baby back ribs); ham sub-primal cuts typically include various cuts of ham; and belly sub-primal cuts include pork belly, bacon, and spareribs.[54] **Figure 1** and **Figure 2** illustrate examples of primal and sub-primal pork cuts.

Figure 1. Example Picture of Primal Cuts of Pork[55]



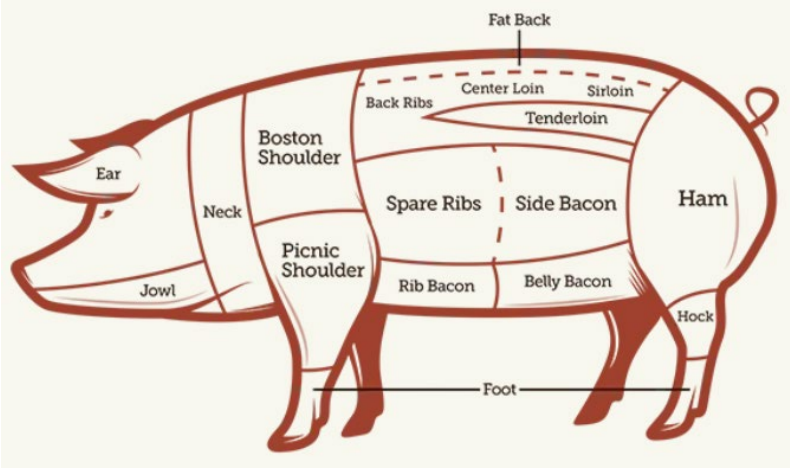
[52] USDA, "What are the Cuts of Fresh Pork?" July 17, 2019, https://ask.usda.gov/s/article/What-are-the-cuts-of-fresh-pork; Smithfield, "Know Your Cuts," accessed Apr. 22, 2022, https://smithfield.smithfieldfoods.com/en-us/articles/pork-101/know-your-cuts/. I note that different sources may define "primal" differently. In particular, "ribs" are frequently considered a primal cut separate from bellies. Indeed, the USDA cutout prices (discussed later in this report) has separate prices for ribs. Shoulder cuts are also at times separated into "picnic" and "butt" primals.

[53] *See, e.g.,* TF-P-001578110, p. 11 (showing the primal cuts, as well as the "carcass breakdown" into retail cuts); HFC-PORKAT0000373007, pp. 24–25.

[54] USDA, "Fresh Pork from Farm to Table," Aug. 6, 2013, https://www.fsis.usda.gov/food-safety/safe-food-handling-and-preparation/meat/fresh-pork-farm-table; USDA, "What are the Cuts of Fresh Pork?" July 17, 2019, https://ask.usda.gov/s/article/What-are-the-cuts-of-fresh-pork.

[55] Seaboard, "Cuts," accessed Dec. 2, 2021, https://seaboardfoods.com/Kitchen/Pages/Cuts.aspx.

Figure 2. Example Picture of Sub-Primal Cuts of Pork[56]



33. Additional steps in the butchering process can create even narrower products that are made available to customers. For example, a cut of pork may come in both boneless and bone-in varieties, with or without skin, or with varying levels of fat trim.[57]

34. Primal and sub-primal cuts refer to the way a hog is butchered for packing, and not necessarily to how the pork products are marketed to consumers or how consumers view them. For example, while spareribs and back ribs come from different primal cuts (belly and loin, respectively), both products are part of the same "rib" bone and may be (in the eyes of consumers) close substitutes for each other.[58] In general, the primal cut from which a specific pork product comes has an impact on its pricing via pork "cutout" prices.[59]

[56] Smithfield, "Know your cuts," accessed Dec. 2, 2021, https://smithfield.sfdbrands.com/en-us/articles/pork-101/know-your-cuts/. *See also* HFC-PORKAT0000373007, p. 21.

[57] North American Meat Processors Association, "The Meat Buyer's Guide," *available at* https://www.thelivestockinstitute.org/uploads/4/9/9/2/49923305/meat-buyers-guide.pdf.

[58] The back rib is the upper portion of a rib bone that connects to the spine, whereas the spareribs is the lower portion of the same bone that extends down around the belly of the hog. Spareribs are often trimmed into a more standardized size and sold as "St. Louis" style ribs. Throughout my analysis in this report, "ribs" will refer to back ribs and spareribs (including those marketed as "St. Louis" style ribs).

[59] As I discuss in greater detail elsewhere in this report, cutout prices form the basis for most (if not all) wholesale prices of pork products. Cutout prices are (essentially) values for each primal cut based on recent downstream (i.e., retail) prices for the various components of that primal cut. The USDA regularly publishes cutout prices.

B. Consumption of Pork

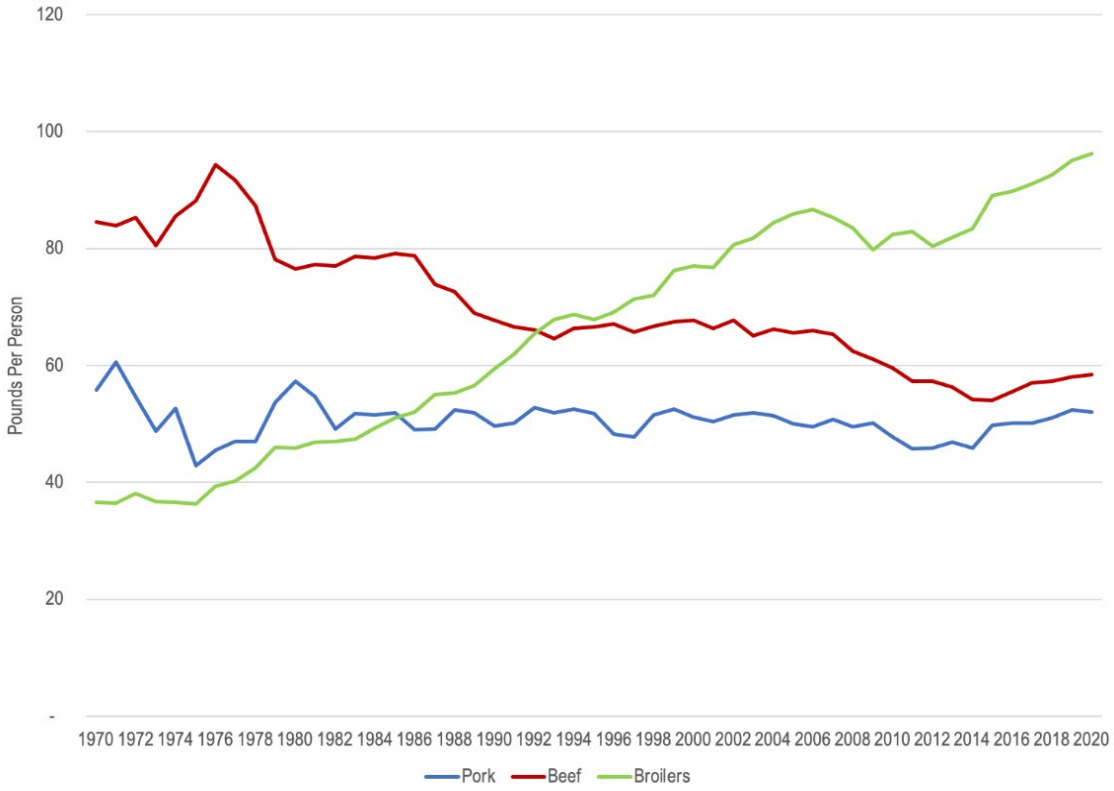
35. Pork is the most consumed meat in the world, accounting for 36% of all meat consumed, followed by poultry (primarily chicken) at 33% and beef at 24%.[60] In the U.S., pork is the third most consumed meat after chicken and beef.[61] Among pork products, ham accounts for the largest share of pork meat consumed in the U.S., followed by sausage and bacon.[62] While consumption has varied from year to year, per capita pork consumption in the U.S. has been relatively stable over the last four decades as shown in **Figure 3**. The stability of pork consumption is particularly noticeable when compared to chicken (also referred to as "broilers") or beef, which have experienced long-term growth and declines, respectively, in per capita consumption.

[60] Food and Agriculture Organization of the United Nations, "Sources of Meat," Nov. 25, 2014, accessed Dec. 30, 2021, http://www.fao.org/ag/againfo/themes/en/meat/backgr_sources html.

[61] Davis, Christopher and Biing-Hwan Lin, "Factors Affecting U.S. Pork Consumption," Economic Research Service Outlook Report *available at* https://www.ers.usda.gov/webdocs/outlooks/37377/15778_ldpm13001_1_.pdf?v=7531.9, P.1.

[62] Pork Checkoff, "Quick Facts: The Pork Industry at a Glance," *available at* https://porkgateway.org/wp-content/uploads/2015/07/quick-facts-book1.pdf, p. 19.

Figure 3. Per Capita U.S. Pork Consumption[63]



36. As Meyer and Goodwin stress, however, that there has been relatively steady pork consumption "does not mean steady pork demand, and the combination of steady consumption and higher real (deflated) pork prices mean that pork demand has increased nicely since 2009."[64] Similarly, a document produced by Agri Stats in mid-2015 emphasizes the strength of pork demand, despite other industry challenges, and states that "pork demand has been on a tear since 2012."[65] Documents and literature indicate that pork demand is driven by a

[63] The USDA tracks the "disappearance" of pork, which is the quantity of pork used in domestic markets. It is common to use disappearance as an estimate of consumption. USDA, "Livestock and Meat Domestic Data: All supply and disappearance: Historical," *available at* https://ers.usda.gov/data-products/livestock-and-meat-domestic-data/. Throughout this report, for ease of reference, I will refer to these data as *USDA Meat Supply and Disappearance. See also* TF-P-002021785; TF-P-000924349, p. 77; CLMNS-0000602477, p. 6; JBS-PORK-01945214–240 (presentation titled "US Disappearance"); SBF0542598 (Seaboard's copy of the Daily Livestock Report, referencing disappearance multiple times).

[64] Steve R. Meyer and Barry Goodwin, "Structure and Importance of the U.S. Pork Industry," *available at* https://nppc.org/wp-content/uploads/2021/06/Competition_Paper_FINALWD.pdf ("Meyer and Goodwin"), p. 22.

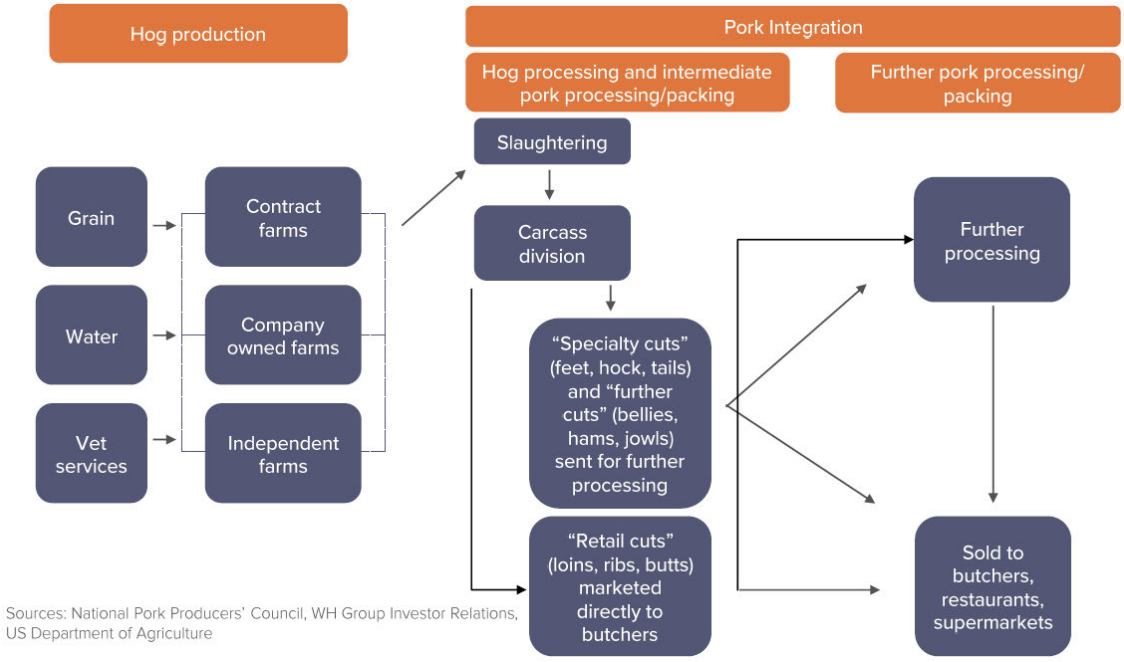
[65] AGSTAT-P-0003380399.

combination of several factors, including seasonality, and the prices of competing proteins, like beef or chicken.[66]

C. Pork Production Process

37. At a high level, the pork production process consists of two phases: 1) hog production, which includes the breeding, farrowing, weaning and finishing stages, and 2) "packing," where hogs are delivered to packers, and then slaughtered, processed, and packaged for sale. **Figure 4** shows a more detailed breakdown of these two phases, including inputs and outputs.

Figure 4. Supply Chain of U.S. Pork Market[67]



38. The pork production process begins with breeding, gestation and "farrowing"—the term for female pigs (sows) giving birth to a litter of piglets. Viable piglets are then raised through a series of steps or phases (e.g., "weaning," "feeding," and eventually "finishing") until they reach market weight. Once a finished hog reaches market weight, it is harvested and converted into pork products.

---

[66] Meyer and Goodwin, p. 15; AGSTAT-P-0003380282–301 at 288; AGSTAT-P-0003475975.

[67] Complaint, ¶ 71.

Breeding, Gestation & Farrowing

39. Female pigs ("gilts") (called sows after having birthed a litter) reach breeding maturity at between 170 to 220 days of age.[68] The gestation period for a gilt or sow is approximately 114 days (slightly less than 4 months).[69] The number of piglets born in a litter can vary, but is commonly between 8 and 13 piglets.[70] During the farrowing period—which spans approximately three weeks starting from birth—sows nurse the piglets, which grow from an initial birth weight of 2–3 lbs. to up to 15 lbs.[71] Litter sizes have generally increased over the past several decades.[72]

Weaning & Feeding

40. As suggested by the name, the weaning phase involves separating piglets from the sow and introducing them to a diet of corn and soybean meal.[73] Over a period of 6 to 8 weeks, these "feeder" pigs will grow rapidly and reach weights of 50–60 lbs.[74]

Hog Finishing

41. The final and longest growing phase for pigs is referred to as "finishing." Over the course of 16-17 weeks, finishing pigs continue to consume large amounts of corn and soybean meal, as well as medical and dietary supplements to ensure proper health and growth.[75] By the end of the finishing phase, the "market hogs" will reach weights of between 250 and 300 pounds and be prepared for harvest.[76]

---

[68] Pork Checkoff, "Life Cycle of a Market Pig." accessed Dec. 27, 2021, https://porkcheckoff.org/pork-branding/facts-statistics/life-cycle-of-a-market-pig/.

[69] Pork Checkoff, "Life Cycle of a Market Pig." accessed Dec. 27, 2021, https://porkcheckoff.org/pork-branding/facts-statistics/life-cycle-of-a-market-pig/.

[70] *Id.*

[71] *Id.*

[72] Michael Langemeier, "Long-Term Trends In Pigs Per Litter," Purdue University Center for Commercial Agriculture, Feb. 5, 2021, https://ag.purdue.edu/commercialag/home/resource/2021/02/long-term-trends-in-pigs-per-litter-2/.

[73] Pork Checkoff, "Life Cycle of a Market Pig." accessed Dec. 27, 2021, https://porkcheckoff.org/pork-branding/facts-statistics/life-cycle-of-a-market-pig/.

[74] *Id.*

[75] *Id.*

[76] *Id.* The typical market weight of a hog has varied somewhat over time, which is why prices for hogs and pork are often standardized into 100-lb increments ("hundredweight" or "cwt"). The hog contracts Defendants enter with growers appear to allow for some variation in the actual weights. JBS-PORK-00220552–560; HFC-

42. Hogs are typically about 6 months old when they reach market-ready weights.[77] Thus, when combined with the gestation period of nearly 4 months, the full life cycle of a market hog is slightly less than one year.[78] However, it is important to note that once a sow has farrowed, it enters its own cycle of recovery and then is farrowed again. Indeed, sows are able to farrow multiple times per year.[79]

Slaughter & Packing

43. After market hogs reach 250–300 pounds in weight, they are brought to processing (packing) facilities where they are inspected before slaughter.[80] The slaughtering process involves numerous steps, including elimination of waste, protection of meat quality, and splitting or trimming to facilitate further processing.[81]

44. Industry and Defendant documents consistently refer to "live weight" as the weight of the hog right before slaughter, while the "dressed weight" is the weight of the carcass after being slaughtered and partially butchered.[82] In general, the ratio of dressed weight to live weight is around 70 – 75%, indicating that the slaughter loss from the initial butchering (removing organs, blood and other inedible parts) is around 25 – 30% of the live weight.[83]

45. Once the initial slaughtering is completed and the carcass has been weighed, rinsed, and chilled, it can be further split into cuts or transformed (e.g., into ground product), packed (either

---

PORKAT0000047054–7071 at 7071; CLMNS-0000704908–921 at 919; JBS-PORK-00541999–2015. *See also* TF-P-001578110, p. 11 (noting an average weight of 275 lbs).

[77] American Meat Science Association, "Pork Production: Farrow to Finish Process," Mar. 9, 2017, https://meatscience.org/TheMeatWeEat/topics/fresh-meat/article/2017/03/09/pork-production-farrow-to-finish-process.

[78] Pork Checkoff, "Life Cycle of a Market Pig." accessed Dec. 27, 2021, https://porkcheckoff.org/pork-branding/facts-statistics/life-cycle-of-a-market-pig/.

[79] American Meat Science Association, "Pork Production: Farrow to Finish Process," Mar. 9, 2017, https://meatscience.org/TheMeatWeEat/topics/fresh-meat/article/2017/03/09/pork-production-farrow-to-finish-process.

[80] *Id. See also* International Center for Food Industry Excellence, "Pork Harvest Process," *available at* https://www.depts.ttu.edu/icfie/upcoming_events/ICFIE_pork_harvest.pdf.

[81] International Center for Food Industry Excellence, "Pork Harvest Process," *available at* https://www.depts.ttu.edu/icfie/upcoming_events/ICFIE_pork_harvest.pdf.

[82] Amanda Cauffman et al., "How much meat should a hog yield?" University of Wisconsin, Madison, accessed Aug. 2, 2021, https://livestock.extension.wisc.edu/articles/how-much-meat-should-a-hog-yield/.

[83] USDA, "Livestock and Meat Domestic Data: All Meat Statistics: Historical," *available at* https://ers.usda.gov/data-products/livestock-and-meat-domestic-data/. See backup production.

frozen or fresh) and then shipped to customers (e.g., wholesalers, retailers, distributors, restaurants, and further processors).[84]

D. Hog Production and Pork Packing

46. Pork packers source their hogs from either their own hog farms, or from external hog growers. All of the packer Defendants exhibit at least some degree of vertical integration by either owning or controlling hog production operations.

1. Pork Packers

47. The pork processing stage is dominated by a small number of packers comprised of the Defendants or co-conspirators in this case. Over the past two decades, Smithfield has consistently been the largest individual packer, with the next largest entities depending somewhat on the precise time in question, and what entities are considered together. For example, at present, JBS is the second largest pork packer in the United States; however, JBS initially entered the U.S. pork market through its acquisition of Swift & Company in 2007.[85] JBS expanded further in late 2015 when it acquired Cargill's pork operations.[86] Similarly, various industry capacity or market share reports may list Seaboard, Triumph, and STF separately.[87] Depending on the context, that may be appropriate; however, as discussed previously, Seaboard and Triumph entered into a marketing agreement in 2004. Under that "strategic alliance," Seaboard "market[s] and sell[s] the pork products produced at the [Triumph] plant."[88] Seaboard and Triumph amended their 2004 agreement in 2015 to create

---

[84] Marvin Hayenga, "Cost Structures of Pork Slaughter and Processing Firms: Behavioral and Performance Implications," *Review of Agricultural Economics* 20, no. 2 (Autumn-Winter, 1998): p. 578; International Center for Food Industry Excellence, "Pork Harvest Process," *available at* https://www.depts.ttu.edu/icfie/upcoming_events/ICFIE_pork_harvest.pdf.

[85] Rogerio Jelmayer, "Brazil's JBS buys Swift Foods for $1.4 bln," *MarketWatch,* May 29, 2007, https://www.marketwatch.com/story/brazils-jbs-buys-swift-foods-for-14-bln.

[86] Reuters, "Brazil's JBS concludes purchase of Cargill pork unit," *Reuters,* Oct. 30, 2015, https://www.reuters.com/article/us-jbs-m-a-cargill/brazils-jbs-concludes-purchase-of-cargill-pork-unit-idUSKCN0SO2OC20151030.

[87] For example, "Pork Checkoff" reports of industry capacity list Seaboard, Triumph, and STF separately. *See, e.g.,* Meyer and Goodwin, p. 10; Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Sept. 17, 2018; Pork Checkoff, "Quick Facts: The Pork Industry at a Glance," *available at* https://porkgateway.org/wp-content/uploads/2015/07/quick-facts-book1.pdf. Similarly, some Defendant documents also list them separately. *See, e.g.,* SMITHFIELD03005050–5057 at 5054; CLMNS-0000615407.

[88] Seaboard Triumph Marketing Agreement, Feb. 2, 2014 (SBF0054466–580).

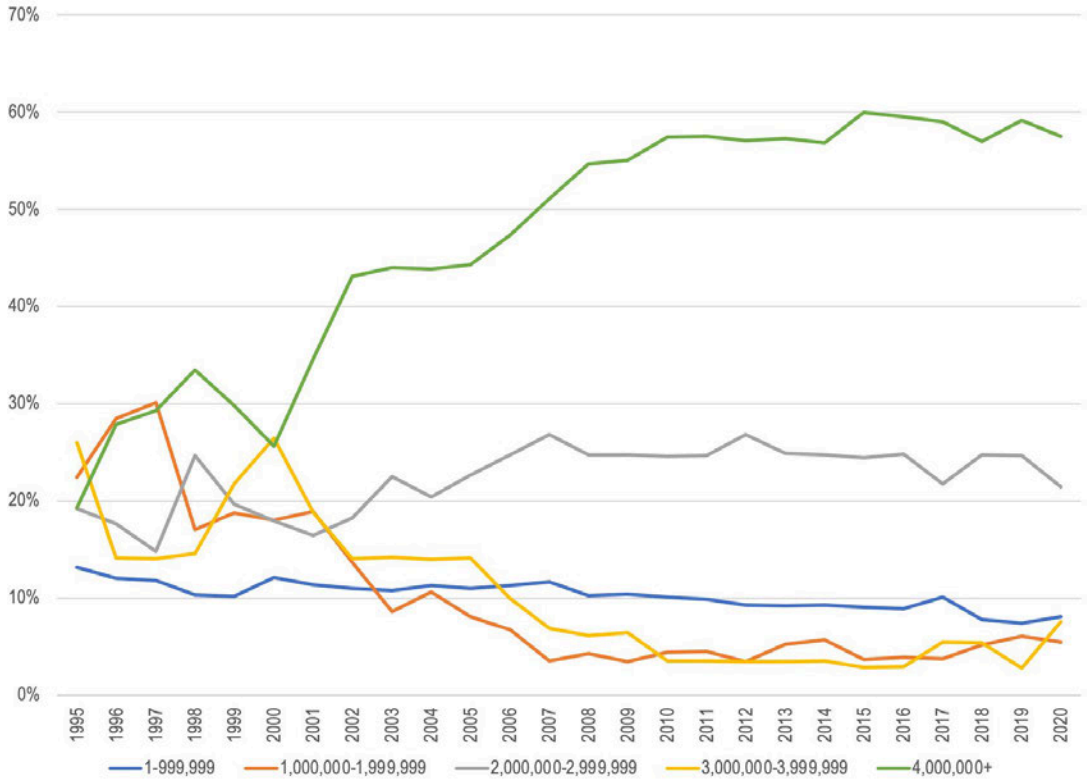
STF as 50-50 joint venture.[89] Because of these considerations, it may be more appropriate or even necessary to consider their market impact together in connection with the marketing and sale of pork. Further, Seaboard, Triumph, and STF produced a single combined sales data set for use in this case; accordingly, unless otherwise stated, I have conducted my analysis using data for these three entities combined rather than separately.

48. Pork packing has increasingly shifted toward fewer and larger operations. For example, "in 1976, only 12 plants slaughtered more than one million hogs . . . 27 percent of the U.S. supply. By 1998 the plants slaughtering over one million hogs had increased to 30, and by 2006, nearly 95 percent of U.S. hogs were slaughtered in plants that handled over one million head annually."[90] **Figure 5** shows how pork packing has increasingly been handled by the largest facilities. As more plants can handle more than a million head a year, smaller plants, and the companies that operated them, closed or were acquired, leading to a decrease in the overall number of packers (see **Figure 6**), as well as an increase in market concentration.

[89] Second Amendment to the Seaboard Triumph Marketing Agreement, May 13, 2015 (SBF0054466–580).

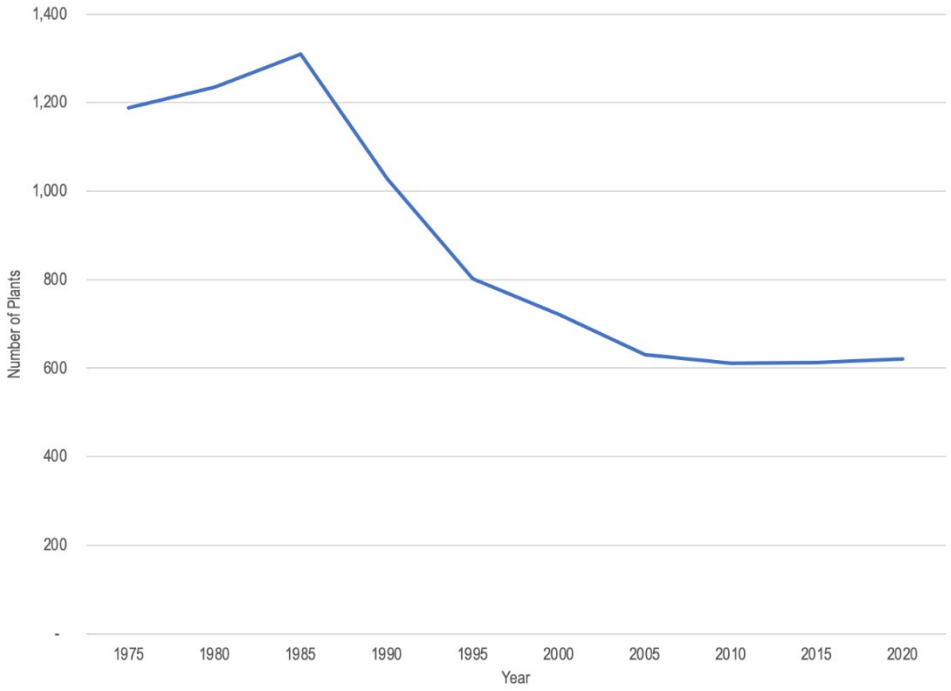
[90] Timothy Wise and Sarah Trist, "Buyer Power in U.S. Hog Markets: A Critical Review of the Literature," *Global Development and Environment Institute,* Working Paper No. 10-04, Aug. 2010, https://ageconsearch.umn.edu/record/179085 ("Wise and Trist"), p. 4.

Figure 5. Percentage of Total Hogs Processed Annually by Facility Annual Processing Capability[91]



[91] USDA, "Livestock Slaughter Annual Summary," *available at* https://usda.library.cornell.edu/concern/publications/r207tp32d.

Figure 6. Total Number of Federally Inspected Packer Plants[92]



49. While **Figure 6** above shows that there are still more than 600 packing facilities in the United States, most of these facilities are very small and do not materially affect the larger pork marketplace. Indeed, as **Figure 5** implies and as shown in National Hog Farmer's survey of pork packing capacity, the vast majority of hogs are packed in massive facilities, almost all of which are controlled by Defendants.[93]

2. Hog Supply

50. A relatively large number of hog growers serve a relatively small number of pork packers. These growers vary in size and level of integration. Not all firms involved in hog production participate in each of the steps described above. Some facilities are built to house the entire

[92] USDA, "Livestock Slaughter Annual Summary," *available at* https://usda.library.cornell.edu/concern/publications/r207tp32d.

[93] The estimated daily U.S. slaughter capacity by plant can be found in data published by Pork Checkoff. *See* Pork Checkoff, "Quick Facts: The Pork Industry at a Glance," *available at* https://porkgateway.org/wp-content/uploads/2015/07/quick-facts-book1.pdf; Pork Checkoff, "Pork Stats 2014," Nov. 21, 2014, *available at* https://texas4-h.tamu.edu/wp-content/uploads/Pork-Facts.pdf; Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Aug. 9, 2017, *available at* https://www.porkcdn.com/sites/porkorg/library/2015/12/estimated_daily_u.s._slaughter_capacity_by_plant_hpd.pdf; Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Sept. 17, 2018. *See also* Meyer and Goodwin, p. 10 (citing *National Hog Farmer*).

growth process of a hog from breeding to slaughter (**farrow-to-finish facilities**),[94] while other facilities breed pigs and sell them after weaning when they are 30 to 60 pounds (**farrow-to-feeder or wean-to-feeder facilities**),[95] while still other firms buy weaned pigs from farrow-to-feeder facilities and feed them to market weight (**feed-to-finish facilities**).[96] Additionally, firms may simply manage sow herds, or be involved in multiple distinct phases of the production process. Circumstances like space, labor availability, access to water and feed, environmental regulations, budgets, and proximity to packers/metropolitan cities all play a role in the optimal facility type for each grower and location.[97] Up until the 2000s, most facilities in the U.S. were farrow-to-finish facilities, but that has changed as more facilities specialize in certain stages of hog production.[98] As an example, the U.S. "Corn Belt" is now home to numerous feed-to-finish facilities, due to the easy access to feed.[99]

51. In addition to relying on their own company-owned hogs, Defendants contract and purchase hogs from a large number of growers throughout the country. Over time, there has been significant consolidation in the hog raising arena, as the number of hog farms has decreased and the share of packer-owned (or controlled) hogs has increased.[100] As discussed in the next section, hogs are purchased both through open markets (spot markets) as well as through extensive contracts with growers.

---

[94] Sarah K. Linneen et al., "Swine Production," *Penn State College of Agricultural Sciences,* June 20, 2005, https://extension.psu.edu/swine-production.

[95] *Id.*

[96] *Id.*

[97] *Id.*

[98] John Giamalva, "Pork and Swine: Industry & Trade Summary." *United States ITC,* Oct. 2014, https://www.usitc.gov/publications/332/pork_and_swine_summary_its_11.pdf, p. 24.

[99] *Id.*
The "Corn Belt" refers to a region encompassing all or part of several midwestern states in the United States. According to the USDA's Agricultural Thesaurus and Glossary, the region refers primarily to Iowa, Illinois, Nebraska, Minnesota, Indiana, and Ohio "where maize is grown on a vast scale." USDA, "Corn Belt Region," accessed Mar. 4, 2022, https://agclass nal.usda.gov/mtwdk.exe?k=glossary&l=60&w=3861&s=5&t=2. The Corn Belt produces a significant share of both U.S. and global corn supplies. *See, e.g.,* World Atlas, "Corn Belt States," accessed Mar. 4, 2022, https://www.worldatlas.com/geography/corn-belt-united-states.html; Kimberly Hickok, "The United States's Corn Belt is making its own weather," *Science,* Feb. 16, 2018, https://www.science.org/content/article/america-s-corn-belt-making-its-own-weather.

[100] Wise and Trist, pp. 4 and 8. *See also* USDA, "Farm Numbers," Dec. 24, 1980, *available at* https://downloads.usda.library.cornell.edu/usda-esmis/files/5712m6524/rv042w78n/zk51vk38j/FarmNumb-12-24-1980.pdf, p. 3; USDA, "Farms and Land in Farms, 2020 Summary," Feb. 2021, *available at* https://downloads.usda.library.cornell.edu/usda-esmis/files/5712m6524/tq57pj927/rx914h75j/fnlo0221.pdf, p. 5.

a. Hog Procurement

52. Hogs are the primary input in the production of pork, and therefore it is important for pork packers like Defendants to have access to a steady and reliable supply of hogs. To this end, Defendants source hogs from a combination of company-owned herds, contract growers, and open market purchases.[101] While Defendants utilize all these methods to procure hogs, the share of hogs that are acquired through each approach varies by company.

53. For example, during the relevant time period, Tyson relied far more on contract growers than it did on its own internal hog production, with documents estimating that only about 4% of its hogs came from its own sow herds.[102] Hormel's degree of vertical integration has changed somewhat over time, as it sold certain sow operations to Smithfield during the Conspiracy Period.[103] However, based on the size of its sow herds throughout the Class Period and its reported slaughter capacity, it appears that Hormel produces a relatively small percent of its pork from hogs that were farrowed by company-owned sows. A Hormel document from the 2014–2015 timeframe suggests that Hormel contracted for between 89 and 97% of its hogs between 2010 and 2015.[104] JBS is one of the largest hog growers and buyers in the country. In 2020, the company's US-based business "purchased more than 24.7 million hogs," of which 14% came from company-owned herds.[105] To my knowledge, Hormel has not produced hog purchase or slaughter data in this matter. I also understand that JBS produced information related to this topic approximately a week before the filing of this report. Therefore, I have yet to review it and my analysis is ongoing.

54. Clemens, Seaboard, and Triumph appear to rely on their own herds more than Hormel, Tyson, and JBS. A Clemens document indicates that approximately two-thirds of its hogs are either

[101] Deposition of Melvin Davis, Dec. 16, 2021, pp. 79:20–80:2; Deposition of Daniel Groff, Dec. 15, 2021, pp. 26:24–28:6.

[102] TF-P-001615446, pp. 5 and 18.

[103] I understand that Champ, LLC, Clougherty packing, and PFFJ were purchased by Smithfield from Hormel in 2017. MarketScreener, "Smithfield Foods, Inc. completed the acquisition of Clougherty Packing, LLC, PFFJ, LLC and Champ, LLC from Hormel Foods Corporation," Jan. 3, 2017, https://www.marketscreener.com/quote/stock/HORMEL-FOODS-CORPORATION-12977/news/Smithfield-Foods-Inc-completed-the-acquisition-of-Clougherty-Packing-LLC-PFFJ-LLC-and-Champ-LL-35236577/.

[104] HFC-PORKAT0000380014, p. 5; HFC-PORKAT0000313651, p. 10 (noting that Hormel's hogs are "95% Contracted" and describing these contracts as "Vertically Coordinated").

[105] JBS, "Pork Suppliers," accessed Apr. 11, 2022, https://sustainability.jbsfoodsgroup.com/chapters/suppliers/pork-suppliers/.

company-owned (raised by contract growers or supplied by its affiliate Country View Family Farms), with the remaining third coming from "independent growers."[106] Similarly, Seaboard and Triumph rely heavily on their own herds. An internal Triumph document indicates that nearly 75% of its hogs are owner-produced,[107] while other documents indicate that Seaboard is over 80% vertically integrated.[108] Seaboard's hog production data in this case indicates that 80% or more of the hogs sent to its plant were company owned through 2015.[109] The share of contracted hogs increased from 16% in 2015 to over 35% by 2020.[110] This shift appears to correspond to the opening of STF's new facility. To my knowledge, Triumph has not produced any hog procurement or slaughter data.

55. Smithfield is the largest pork packer in the United States and produces a large number of market hogs from its own herds. However, the company also utilizes outside growers—including contract growers and independent growers—for its hog supplies.[111] An internal Smithfield presentation from 2015 states that the company relies on 2,000 "contract swine growers."[112] However, the same document indicates that these growers are not independent farmers that sell market hogs to Smithfield; rather, Smithfield "owns animal inventory, provides all feed, supplies, and technical support."[113] The same presentation indicates that Smithfield's company-owned growers produce approximately 16.5 million market hogs per year. However, Smithfield's slaughter data shows that, during 2015, the company processed over 31 million market hogs—suggesting that company-owned hogs account for a little under 50% of its hog supplies.[114]

[106] CLMNS-0000031669.
[107] TRI0000390682, p. 2.
[108] TF-P-000134191, p. 21; TRI0000390682, p. 2.
[109] SeaboardSD0009 (tab "Finisher – Yearly"). See backup production.
[110] *Id.*
[111] *See, e.g.,* PFI00019191; SMITHFIELD01121927.
[112] SMITHFIELD01285587–647 at 603.
[113] *Id.*
[114] SMITHFIELD01285587–647 at 593 (16,451,014 market hogs per year); compare with SMITHFIELD04771010 (showing 31,206,000 hogs slaughtered in 2015).

b. Pricing for Hogs

56. Historically, pork packers primarily purchased hogs through open-market negotiations with growers (i.e., the spot market).[115] While some hogs are still sold in this fashion, the use of the spot market has declined over the past two decades.[116] As I discuss later in this report, Defendants have significant buyer power in the hog market, and the declining use of the spot market has exacerbated this in certain ways. With fewer negotiated sales, the marketplace has less price discovery, which makes it more difficult for buyers and sellers to accurately gauge the fair market price of hogs. This trend has increased the power of the packer companies, which "have a large number of farmers [growers] to choose from, while many farmers have just one or two packers offering them contracts. Under such conditions, farmers often have to accept the contract terms the packer is offering."[117] Thus, in negotiations or even disputes, growers increasingly face 'take-it-or-leave-it' scenarios where they have no other options. Growers who end up in disputes with packers may even face the risk of being blacklisted.[118]

57. More recently, instead of using the spot market, most hogs (that are not company-owned) are sold through hog contracts.[119] Hog contracts generally take one of two forms: production contracts and advanced marketing agreements.[120] Regarding production contracts between a grower and packer, packers maintain ownership of the hogs and provide most, if not all, inputs to the grower, while the grower raises the hog for an agreed upon fee.[121] Under an advanced marketing agreement, an agreement of future sale, the grower maintains ownership of the hogs and the agreement typically dictates the quantity, quality, and timing of hog delivery, as well as the payment formula.[122]

---

[115] Wise and Trist, p. 10.

[116] Meyer and Goodwin, pp. 17–19.

[117] Wise and Trist, p. 11.

[118] Wise and Trist, pp. 11–12, referencing this with respect to the poultry industry. United States Department of Justice/United States Department of Agriculture Public Workshops Exploring Competition In Agriculture, Poultry Workshop, May 21, 2010, pp. 343–344. Several Defendants are also poultry integrators.

[119] Wise and Trist, p. 7.

[120] Wise and Trist, p. 11.

[121] *Id.*

[122] Wise and Trist, p. 11.

58. The prices Defendants pay under hog contracts are often tied to a "base" price, which is based on spot market prices.[123] Information on spot market prices is published regularly (twice daily) by the USDA, with reports including the number of hogs and negotiated prices from multiple regions (e.g., Western Cornbelt, Iowa/Minnesota), as well as a national average. An example of such a report is shown below. These reports also indicate the number of hogs brought to market outside of the spot market (*i.e.*, through contracts). As seen in the example below, **Figure 7**, "Negotiated" or spot-market sales account for a relatively small share of the total number of hogs sold.

[123] *See, e.g.,* HFC-PORKAT0000046909–937 at 913–914; HFC-PORKAT0000291060; HFC-PORKAT0000048877–896 at 881 (draft form); PFI00019199–222 at 221 (2014 Triumph agreement with Prestage Farms).

Figure 7. Example of USDA Hog Report[124]

USDA **Daily Direct Afternoon Hog Report**

Agricultural Marketing Service
Livestock, Poultry, and Grain Market News

February 16, 2022
LM_HG217

Email us with accessibility issues regarding this report.

Plant Delivered Purchase Data For Wednesday, February 16, 2022

(Includes information from 1:30 PM to 1:30 PM.)

Current Volume by Purchase Type
Barrows and Gilts Live and Carcass Basis

	Estimated Today	Actual Today	Actual Week Ago	Actual Year Ago
Producer Sold				
Negotiated	10,457	10,457	10,374	11,572
Other Market Formula (Futures/Options)	21,729	21,729	26,017	32,395
Swine or Pork Market Formula	129,995	129,995	123,370	132,938
Other Purchase Arrangement	66,796	66,796	62,488	58,672
Negotiated Formula	955	955	475	163
Packer Sold (all purchase types)	31,929	31,929	30,802	34,256

Volume and Price Range For Barrows and Gilts
Purchased Swine (Including Packer Sold)

	National	Iowa/Minnesota	Western Cornbelt	Eastern Cornbelt
Negotiated (Carcass)	(LM_HG203)	(LM_HG206)	(LM_HG212)	(LM_HG210)
Head Count	9,178			
Lowest Base Price	80.00			
Highest Base Price	99.00			
Weighted Average Price	91.47	97.61	97.11	*
Change from Previous Day (LM_HG217)	2.06	*	1.18	*
5 Day Rolling Average	87.82	93.76	93.84	
Negotiated Formula (Carcass)				
Head Count	955			
Lowest Base Price	*			
Highest Base Price	*			
Weighted Average Price	*	*	*	*
Combined Negotiated and Negotiated Formula (Carcass)				
Head Count	10,133			
Lowest Base Price	*			
Highest Base Price	*			
Weighted Average Price	*	*	*	*

59. While the USDA reported prices have been most commonly used over time, other measures are also used, especially in later periods. For example, an amended 2017 Tyson agreement with a group of hog growers sets hog prices based on the "Lean Hogs" futures prices at the

[124] The USDA's Daily Direct Hog Reports are published online. USDA, "Swine Direct Reports," accessed Apr. 22, 2022, https://www.ams.usda.gov/market-news/swine-direct-reports. Separate morning and afternoon reports are published each day. The afternoon report shown above is from February 16, 2022. The current afternoon report can also be found online. USDA, "Daily Direct Afternoon Hog Report," accessed Apr. 22, 2022, https://www.ams.usda.gov/mnreports/ams_2675.pdf.

Chicago Mercantile Exchange ("CME").[125] In addition to negotiated prices and contracts, the "base" price in a hog contract may also be based on formulas that directly reference market corn and soybean meal prices, or a combination of these elements with negotiated prices. For example, a 2011 Hormel agreement with Maschhoffs[126] specifies base prices as "the greater of either" an "Ordinary Base Price" and a "Minimum Base Price," where the former relies on USDA negotiated hog prices and cutout values, and the latter is based explicitly on a "Corn/Soy Component" formula that is tied to market values for corn and soybean.[127] A term sheet between Smithfield and Maschhoffs from 2011 shows similar terms.[128] Tyson's purchase agreement with Prestage (another large hog grower that has supplied many, if not all, Defendants) set base prices according to USDA cutout values.[129] A 2011 Clemens agreement with hog grower Pork Champ sets prices based on the averages of the Eastern and Western Cornbelt prices from the prior day.[130]

60. Further, hog contracts may include additional terms that increase or decrease the final price growers receive. Such terms often relate to weight, muscle mass and quality, the health of the animals at delivery, compliance with animal welfare standards, and other factors.

c. Hog Contract Duration and Size

61. Documents produced in this case indicate that Defendants regulated their supply of hogs through contracts with wide-ranging durations and specified volumes. As would be expected with farrowing cycles, most contracts cover at least one year (often with the possibility or expectation of renewal), although shorter contracts exist as well. For example, in 2009, JBS and Shulista Farms entered into a series of short-term contracts with two-week delivery periods

[125] TF-P-000800928–950 at 937; PFI00019191 (Smithfield and Prestage Farms agreement from 2014, which notes that the CME index itself is based on an average of recent USDA negotiated and market formula prices).

[126] Maschhoffs is a large hog grower that supplies many (if not all) Defendants with market hogs. *See, e.g.,* HFC-PORKAT0000047054–7071; JBS-PORK-00250181; SMITHFIELD00905745; SMITHFIELD01121927–929; SMITHFIELD03867890; TF-P-001633705–706; TRI0000387004–7036; JBS-PORK-00309581.

[127] HFC-PORKAT0000047054–7071 at 7055–7056.

[128] SMITHFIELD00905745–747 at 746–747. *See also* SMITHFIELD01121927–929.

[129] PFI00019223–263 at 232. The document also includes terms from earlier years.

[130] CLMNS-0000704908–921.

during 2010.[131] Hormel had a 1-month contract with Producers Livestock Marketing Association for 11,000 hogs in February 2016,[132] and Triumph had a contract purchasing a total of 10,000 hogs over a 5-week period from Midwest Farmers Co-op in 2007.[133] Contracts may be large or small quantities of hogs. For example, Tyson had a contract with Lee Oelmann for just 3,150 hogs in 2011.[134]

62. Larger-scale hog growers, like Maschhoffs and Prestage, that supply Defendants with hundreds of thousands (or even millions) of hogs per year, typically have longer-term contracts.[135]

3. Pork Production Costs

63. The major cost components for pork products include the cost of a) farming or acquiring the hog itself, and b) processing it (e.g., slaughter and packaging). The cost of a hog historically accounts for between approximately 80 and 85% of dressed carcass costs.[136] The cost of raising hogs is driven by changes in the cost of feed, which, as shown in **Figure 8,** account for roughly two thirds to three quarters of variable hog production costs.[137]

[131] JBS-PORK-00541999–2015. For a contract of such short duration, the price was not directly tied to market indices, but was fixed in advance. For example, the parties agreed on a price of $62 per head for 200 hogs to be delivered between February 1, 2010, and February 15, 2010, and a price of $62.15 per head for 200 hogs delivered between August 1, 2010, and August 15, 2010. JBS-PORK-00541999–2015 at 1999 and 2015.

[132] HFC-PORKAT0000291060–1064 at 1060–1062. The parties entered an additional contract for 18,000 hogs in the same period, using a different base market adjustment. *Id*. at 1063–1064.

[133] TRI0000481594; TRI0000481873.

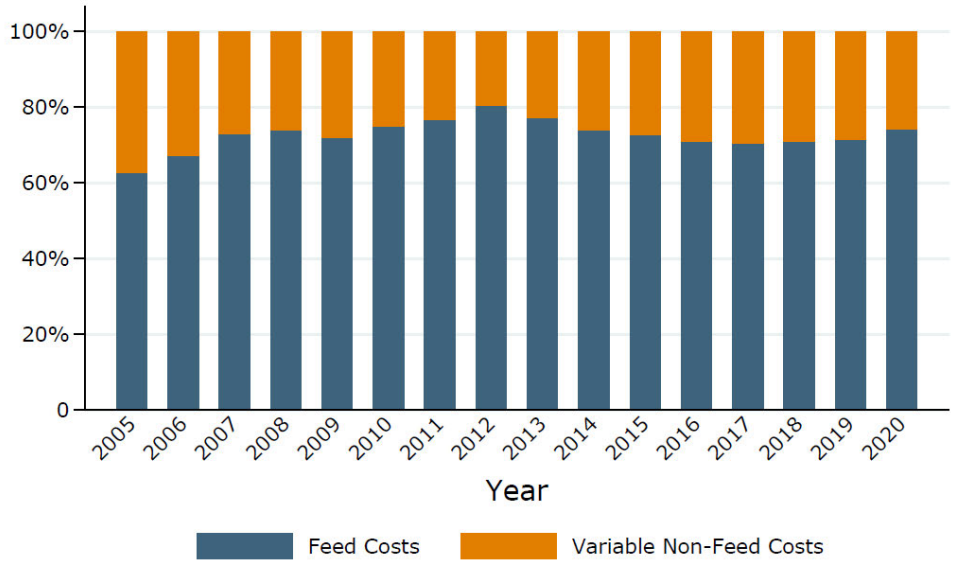
[134] TF-P-002252585.

[135] *See* HFC-PORKAT0000047054–7071; JBS-PORK-00250181; SMITHFIELD00905745; PFI00001089; PFI00001270; PFI00005331; PFI00005708; PFI00019191–198; PFI00019199–222; PFI00019223–263; SMITHFIELD03867890; JBS-PORK-00309581.

[136] See backup production. This is generally consistent with an earlier study that suggests hog costs accounted for approximately 70% of total pork production costs. *See* Marvin Hayenga, "Cost Structures of Pork Slaughter and Processing Firms: Behavioral and Performance Implications," *Review of Agricultural Economics* 20, no. 2 (Autumn-Winter, 1998): pp. 574–583.

[137] Peter Lammers et al., "Feed Budgets," *Iowa State University, available at* https://www.ipic.iastate.edu/publications/840.feedbudgets.pdf.

Figure 8. ISU Estimated Feed and Variable Non-Feed Costs[138]

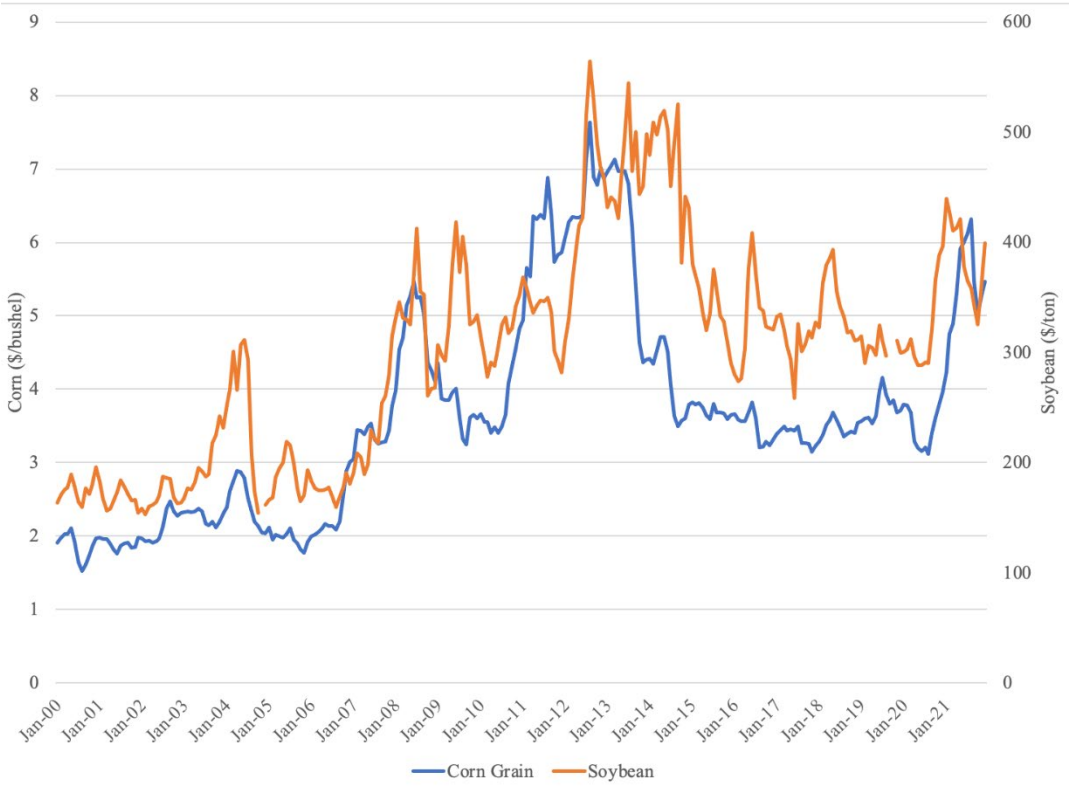


64. The primary ingredients in feed are corn and soybeans, and prices for these ingredients vary depending on market conditions and crop productivity.[139] Other costs associated with raising and finishing hogs include labor, veterinary/hog health fees, transportation, and building maintenance. As shown in **Figure 9** below, corn and soybean prices have seasonal fluctuations and have experienced sharp increases and decreases over time.

[138] See backup production. *See also* Lee Schulz, "Estimated Returns - Swine: Farrow to Finish," *Iowa State University,* accessed Feb. 14, 2022, http://www2.econ.iastate.edu/estimated-returns/.

[139] *Id.* As seen in that data, corn is by far the largest individual component of cost, while soybean meal, dried distillery grains, and other ingredients account for smaller shares.

Figure 9. Corn and Soybean Costs[140]



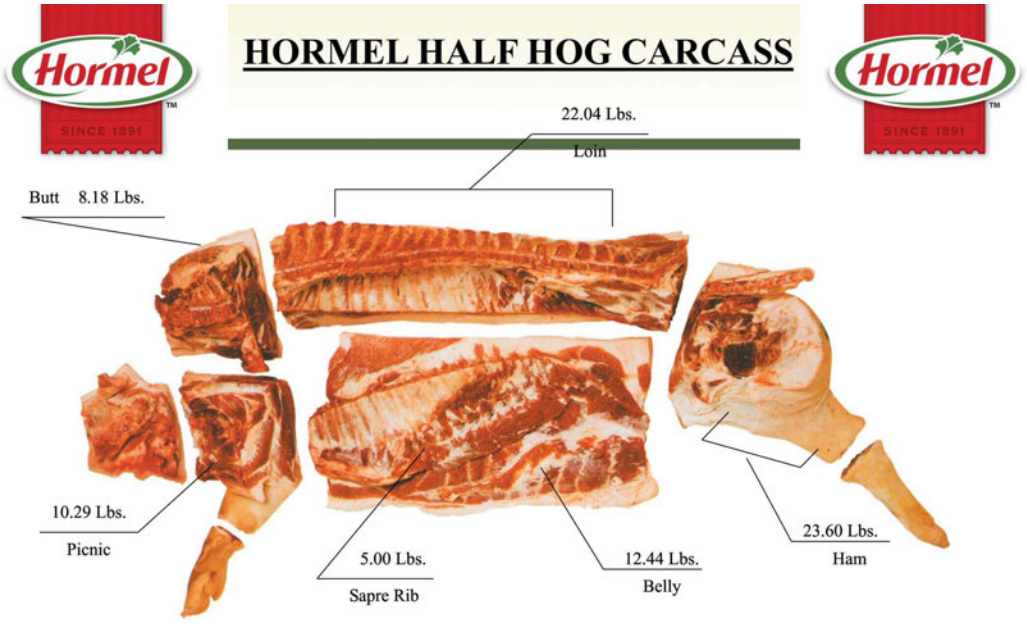
65. After the hog reaches maturity, a packer incurs processing costs, including the costs to slaughter it. The amount of additional processing costs depends on the degree of butchering—conceptually, pork sold as large, untrimmed primal cuts would require less labor and machinery cost than, say, the equivalent weight of thinly-cut pork chops from the same primal cut. Curing and smoking costs such as salt and other seasonings may contribute additional costs for value-added products like bacon or prepared ham.

4. Pork Product Pricing

66. It is obviously not possible to grow only certain parts of hogs—each hog carcass necessarily has two shoulders, two hams, two sides, and two back loins, as shown in **Figure 10** below (for a half carcass).

[140] USDA Economic Research Service, "Feed Grains Database," *available at* https://data.ers.usda.gov/FEED-GRAINS-custom-query.aspx.

Figure 10. Hog Carcass Cut[141]



67. As also seen in this image, not all primal cuts are of equal size or weight. However, consumers do not necessarily value all pork products equally. Because of this conflict, packers price pork using methods that reflect the different market values for different cuts of pork. Specifically, the "cutout value" is the "sum of the prices of the various wholesale cuts multiplied by the percentage of the carcass they represent."[142] Cutout values are calculated by the USDA from information produced by pork packers (like Defendants), which are required to report sales (prices and pounds) on a daily basis under the USDA's Livestock Mandatory Reporting Program.[143] Cutout values are primal-specific, with each individual primal's cutout value calculated as the weighted average price received for that primal (or the products derived from it) in the marketplace. Once this value is obtained for each primal, they can be combined (again

[141] HFC-PORKAT0000373007, p. 25.

[142] Meyer and Goodwin, p. 16; Dustin Baker, "Understanding USDA cutout reports," *National Hog Farmer,* Mar. 2, 2020, https://www.nationalhogfarmer.com/marketing/understanding-usda-cutout-reports.

[143] USDA, "Livestock Mandatory Reporting," 2018, https://www.ams.usda.gov/sites/default/files/media/LMR2018ReporttoCongress.pdf, p. 3.

using weight to apportion value) to create a "carcass equivalent" cutout value.[144] The USDA's Agricultural Marketing Service publishes current cutout values for both primal cuts and carcass equivalents several times a day (and week).[145] An example of such a report is shown in **Figure 11** below.

Figure 11. Example of USDA National Daily Pork Cutout Report

USDA National Daily Pork Report FOB Plant - Negotiated Sales - Afternoon

Agricultural Marketing Service
Livestock, Poultry, and Grain Market News
Email us with accessibility issues regarding this report.

February 16, 2022
LM_PK602

Loads PORK CUTS	:	196.62
Loads TRIM/PROCESS PORK	:	34.68

USDA Estimated Pork Cut-Out Values - as of 2:00pm
Based on negotiated prices and volume of pork cuts delivered within 14 days and on average industry cutting yields. Values reflect U.S. dollars per 100 pounds.
Calculations for 215 lb Pork Carcass. 55-56% lean, 0.55"-0.70" BF Last Rib

Today's Estimated Primal Cutout Values

Date	Loads	Carcass	Loin	Butt	Pic	Rib	Ham	Belly
02/16/2022	231.31	106.52	99.09	112.54	57.74	163.67	73.22	209.25
Change:		-0.20	-6.25	2.68	0.24	0.98	-1.35	7.88
02/15/2022	324.78	106.72	105.34	109.86	57.50	162.69	74.57	201.37
02/14/2022	280.42	107.98	108.36	107.58	62.42	161.66	78.54	196.65
02/11/2022	281.91	109.96	108.23	114.85	60.07	157.23	89.13	191.87
02/10/2022	241.64	101.48	102.18	105.87	58.91	158.67	66.76	188.90
Five Day Average --		106.53	104.64	110.14	59.33	160.78	76.44	197.61

68. As I discuss in greater detail later in this report, (recent) historical cutout values are widely used by Defendants to determine current and future transaction prices for pork products.

E. The Global Pork Market

69. Export markets play an important role in the pork market. I understand that Defendants are alleged to have increased use of exports to help facilitate the alleged conspiracy, since the amount of pork exported has a direct and significant impact on the domestic supply and, more

[144] Dustin Baker, "Understanding USDA cutout reports," *National Hog Farmer,* Mar. 2, 2020, https://www.nationalhogfarmer.com/marketing/understanding-usda-cutout-reports.

[145] USDA, "Livestock Mandatory Reporting," 2018, https://www.ams.usda.gov/sites/default/files/media/LMR2018ReporttoCongress.pdf, p. 15; USDA, "A User's Guide to USDA's LMR Pork Reports," 2018, https://www.ams.usda.gov/sites/default/files/media/LMRPorkPriceReportsHandout.pdf, p. 1.

importantly, the domestic price of pork products. For example, as noted by the USITC, "researchers at the University of Missouri-Columbia estimated that a 1% increase in net exports as a share of U.S. pork production translates into a 3.3% increase in U.S. hog prices."[146] As I discuss in detail later in this report, increased exports led to higher prices for pork that remained in the domestic marketplace, and Defendants frequently discussed the need to cause this effect.

70. In terms of total pork production, as shown in **Figure 12**, the U.S. has been a net exporter since 1995, and is one of the largest exporters in the world. The U.S. pork industry enjoys competitive advantages over foreign counterparts, in part due to improvements in production techniques. The use of Ractopamine (a drug that improves the lean meat growth in hogs),[147] scale efficiencies,[148] genetic manipulation,[149] and improved practices[150] are just a few ways in which the U.S. industry has improved productivity.

[146] John Giamalva, "Pork and Swine: Industry & Trade Summary," *United States ITC,* Oct. 2014, https://www.usitc.gov/publications/332/pork_and_swine_summary_its_11.pdf, p. 38.

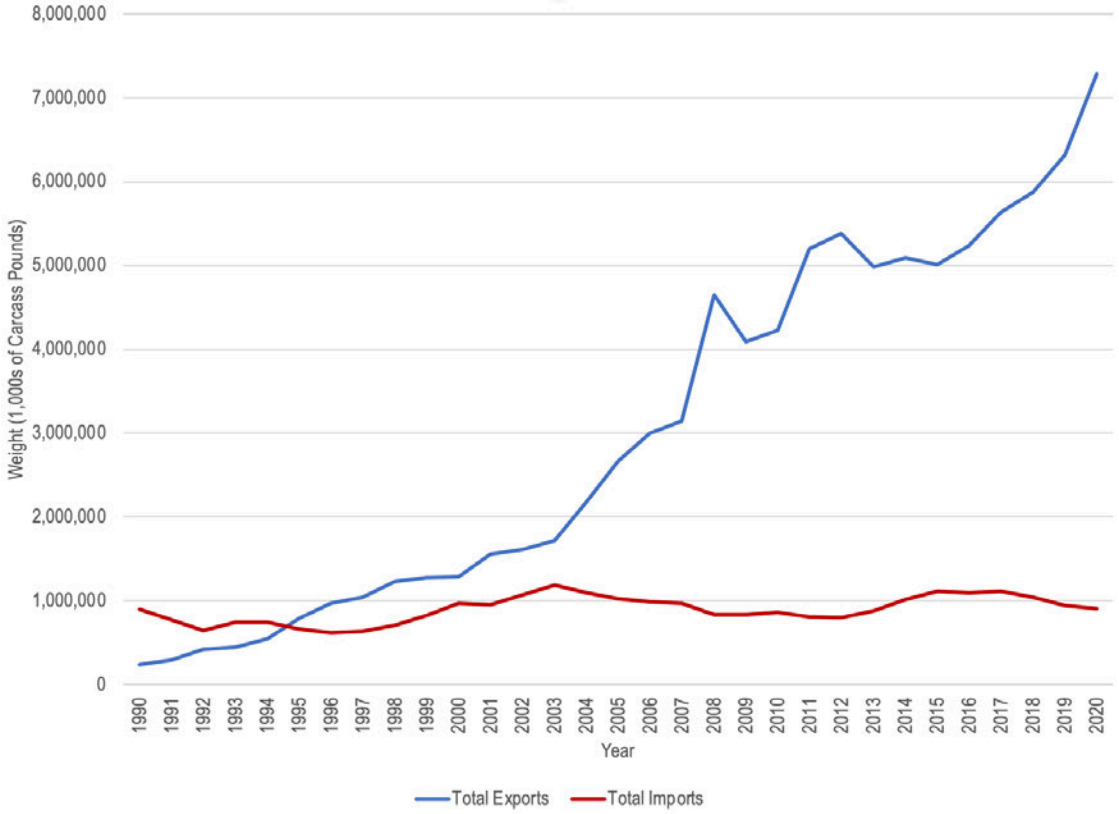
[147] Jodi Sterle, "The Facts about Paylean: Ractopamine for Swine," *Texas A&M University,* http://animalscience.tamu.edu/wp-content/uploads/sites/14/2012/04/ASWeb-093-TheFactsaboutpayleanractopamineforswine.pdf.

[148] William Mcbride and Nigel Key, "Economic and Structural Relationships in U.S. Hog Production," USDA Agricultural Economic Report No. 818, Feb. 2003, https://www.ers.usda.gov/publications/pub-details/?pubid=41524.

[149] John Giamalva, "Pork and Swine: Industry & Trade Summary." *United States ITC,* Oct. 2014, https://www.usitc.gov/publications/332/pork_and_swine_summary_its_11.pdf, pp. 25 and 33.

[150] Wise and Trist.

Figure 12. U.S. Total Exports and Imports[151]



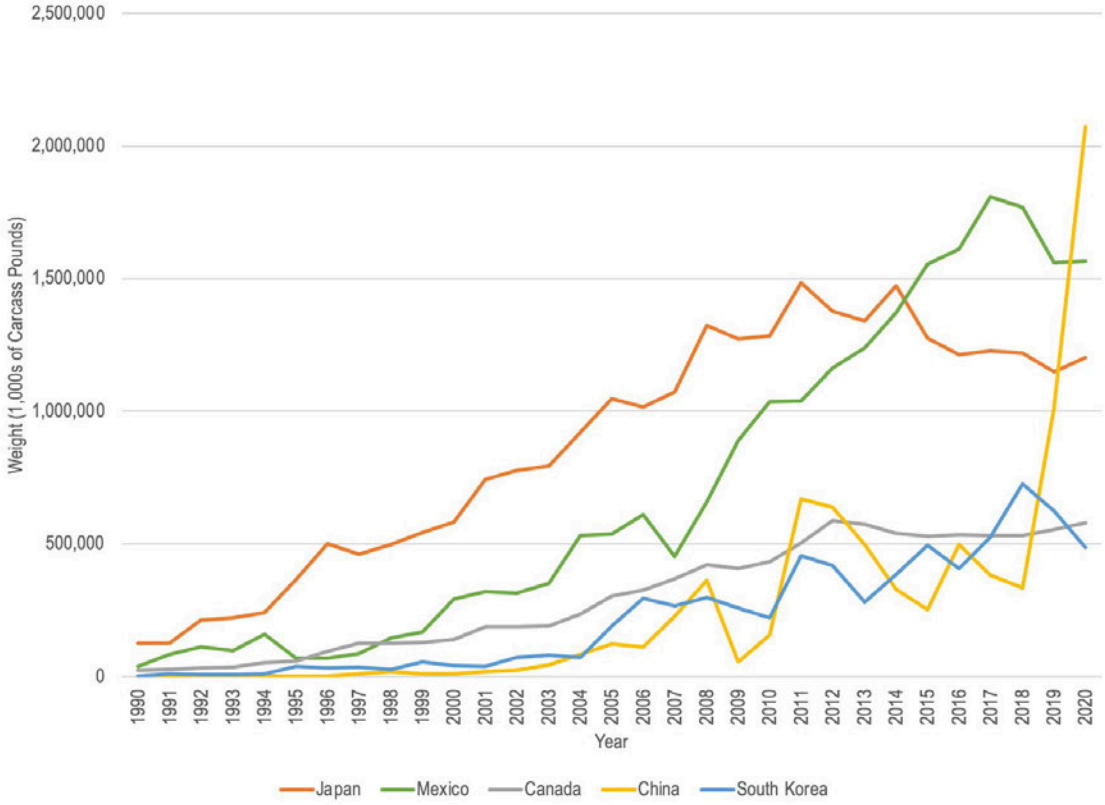
71. As shown above, imports are a small fraction of domestic pork supply, ranging from 3% to 5% between 2005 and 2019.[152] In terms of export destinations, Mexico, Japan, China, and Canada have historically been the largest purchasers of U.S.-made pork.[153] As shown in **Figure 13** below, South Korea has also become a significant buyer of U.S. pork over the past two decades.

[151] USDA, "Livestock and Meat International Trade Data," *available at* https://www.ers.usda.gov/data-products/livestock-and-meat-international-trade-data/. Analysis performed using "Pork: annual and cumulative year-to-date U.S. trade (carcass weight, 1,000 pounds)" dataset.

[152] *USDA Meat Supply and Disappearance.*

[153] USDA, "Sector at a Glance," USDA Economic Research Service, accessed July 30, 2021, https://www.ers.usda.gov/topics/animal-products/hogs-pork/sector-at-a-glance/ ("The primary markets for U.S. pork products are Mexico (which accounts for about one-third of U.S. exports), Japan, China/Hong Kong, and Canada. In the last decade, these 4 countries accounted for 75% of the U.S. pork exports.").

Figure 13. U.S. Exports by Country (Top Five)[154]



72. Global demand for U.S. pork has generally been on the rise. Reasons for this growth vary somewhat by country (of destination), but include generally rising incomes, opening of trade borders, fluctuations in exchange rates, and disparity in the impact of disease outbreaks that affect other countries' abilities to produce pork.[155] While global demand has been increasing on average, exports to specific countries or groups of countries can rise or fall sharply during any given period due to changes in local or global circumstances. For example, the 2008 Olympics held in China reportedly led to increased exports to China, which ultimately

[154] USDA, "Livestock and Meat International Trade Data," *available at* https://www.ers.usda.gov/data-products/livestock-and-meat-international-trade-data/. Analysis performed using "Pork: annual and cumulative year-to-date U.S. trade (carcass weight, 1,000 pounds)" dataset.

[155] USDA, "USDA Agricultural Projections to 2030," USDA Interagency Agricultural Projections Committee Long-Term Projections Report OCE-2021-1, Feb. 2021, *available at* https://www.ers.usda.gov/webdocs/outlooks/100526/oce-2021-1.pdf, p. 82.

accounted for 7% of all U.S. production in the first half of 2008.[156] In contrast, concerns over the Swine Flu led to some restrictions on exports of U.S. pork in mid-2009.[157]

F. Domestic Supply of Pork During the Relevant Timeframe

73. Defendants are alleged to have agreed to collectively and artificially restrict the supply of pork in the U.S. As a matter of economics, reducing or restricting the supply of pork has the effect of raising prices. Conceptually, Defendants could impact the supply of pork in the United States in several ways. First, Defendants have significant influence—either through direct ownership or through extensive contracting—over the volume of hogs that are raised domestically. If Defendants reduce or restrict growth in hog raising, that will necessarily lead to a reduction in the amount of pork that can be produced. Second, Defendants could reduce packing capacity, thereby reducing the total amount of pork that enters the marketplace. Third, Defendants could limit the amount of pork available to U.S. customers by increasing the share of domestic production that is exported to other countries.

1. Reduction in Number of Hogs Entering the Marketplace

74. The most straightforward way to reduce the supply of pork in the United States is to reduce the number of hogs that come to market. The number of hogs that come to market is a function of the number of sows who produce piglets, and the number of piglets retained from the farrowing process. The number of sows can be reduced through early retirement of existing sows, lower replacement of retiring sows, or both. The number of piglets retained from farrowing can be reduced by heightening "viability" requirements. These methods are all consistent with comments made by Joe Szaloky (of Murphy Brown, a subsidiary of Smithfield) in the fall of 2008, in which he stated that Smithfield was "focusing on reducing the number of pigs that come off sow farms, and making sure the ones that come off are worthy of the investment in feed."[158]

---

[156] National Hog Farmer, "Recession May Help Pork Producers Survive," *National Hog Farmer,* Dec. 23, 2008, https://www.nationalhogfarmer.com/marketing/news/recession-helping-producers-1223.

[157] CRS, "Potential Farm Sector Effects of 2009 H1N1 'Swine Flu': Questions and Answers," Congressional Research Service, Jan. 12, 2010, https://crsreports.congress.gov/product/pdf/R/R40575/11.

[158] Betsy Freese, "Pork Powerhouses 2008: The Big Squeeze," *Successful Farming,* Sept. 4, 2008, *available at* https://www.agriculture.com/livestock/hogs/The-big-squeeze-Pork-Powerhouses-2008_283-ar4443.

75. Defendants undertook cuts to sow herds and pigs during the Conspiracy Period that would have had the effect, other things equal, of reducing the amount of pork available to DPPs. Because of the length of the farrowing and life cycle for hogs, reductions in sow herds do not lead to an immediate reduction in pork. During 2008, Defendants were announcing that they were taking actions that would reduce pork supplies by 2009. For example, Larry Pope of Smithfield explained that his company had taken "the leadership position" in early 2008 with "a reduction of 50,000 sows and 1 million of our 18 million pigs."[159] Industry reports indicate that Tyson, Hormel, and Triumph also dramatically reduced the size of their sow herds. By fall 2008, Hormel had reduced its sow herd size from 63,000 to 54,000 (over 14%).[160] Tyson reduced its herd from 70,000 sows in 2008 to 52,000 (nearly 26%) in 2009.[161] Triumph cut its sow herd by 24,500 head for 2009.[162] These reductions marked a dramatic shift from the historical and long-term expansionary practices of these companies. Betsy Free, author of the annual "Pork Powerhouses" industry report, wrote in late 2007, prior to these industry reductions, "Some things you can just take to the bank. Sow herd expansion among the Pork Powerhouses would fall into that category."[163] Freese noted at that time, "This is the fourteenth year of [Pork Powerhouses and that the] only constant in all that time is that 20 biggest farms will add more sows, every year."[164]

76. Defendants continued reductions throughout 2009, and by the fall of 2009, Freese reported (in an article titled "Pork Powerhouses 2009: Big Boys Cut Back") that for the "first time since the annual Pork Powerhouses® ranking was launched in 1994, the nation's largest 25 producers have cut sow numbers."[165] After touting that it had already liquidated "two million market hogs annually," Smithfield's Larry Pope said that the company would undertake a

[159] Complaint, ¶ 138.

[160] TF-P-002358138; Betsy Freese, "Pork Powerhouses 2008," *Successful Farming,* 2008, *available at* https://www.agriculture.com/system/files/PorkPowerhouses_2008_0.pdf.

[161] *Id*. *See also* Betsy Freese, "2009 Pork Powerhouses," *Successful Farming,* 2009, *available at* https://www.agriculture.com/system/files/Pork%20Powerhouses%202009.pdf

[162] *Id.*

[163] Betsy Freese, "Pork Powerhouses 2007: Run-Up in Rations," *Successful Farming,* Oct. 3, 2007, *available at* https://www.agriculture.com/livestock/hogs/Pork-Powerhouses-2007_283-ar3178.

[164] *Id*.

[165] Betsy Freese, "Pork Powerhouses 2009: Big Boys Cut Back," *Successful Farming,* Sept. 14, 2009, *available at* https://www.agriculture.com/livestock/hogs/pk-powerhouses-2009-big-boys-cut-back_283-ar5700.

further reduction of its sow herds going forward.[166] Smithfield continued to stress that "liquidation" was a necessary step for "all in the industry."[167] Tyson's CEO agreed with this sentiment a month later, noting that its profitability would be improving due to "liquidation" and reduced pork production "into 2010 and beyond."[168] JBS's CEO indicated around the same time that its margins would be improving due to liquidation.[169]

77. Pope emphasized that Smithfield alone could not "fix" the problem it perceived in the pork industry, and that reducing the supply of pork would require other packers to follow suit. In June 2009, Pope explained that earlier cuts were not sufficient and that "Somebody else (i.e., other than just Smithfield) has got to do something."[170] In September 2009, Pope said the "industry has got to solve it collectively," and that he had spoken with "several sizeable, more than sizeable large producers, in fact very large producers, and I would tell you they are doing some liquidation."[171]

78. This view was echoed by industry participants, like Mark Greenwood of AgStar, who "called on U.S. pork producers to follow the lead of the broiler and dairy industries by reducing production" in February 2009.[172] After Greenwood called for a reduction of at least 300,000 sows, Dale Miller (of *National Hog Farmer*) noted that U.S. producers had cut 160,000 sows since fall 2008, and referred to these cuts as part of the "industry's stimulus package."[173] After Tyson began cutting its own sow herds (and therefore, future hog production), Greenwood continued to argue that other pork producers must "follow Smithfield's and Tyson's lead on reducing sow numbers."[174]

---

[166] DPP-Pork0000006903–944 at 908.

[167] Complaint, ¶ 141; Joe Vansickle, "Smithfield Postpones Sow Stall Phaseout," *National Hog Farmer,* July 15, 2009, *available at* https://www.nationalhogfarmer.com/genetics-reproduction/sow-gilt/0715-smithfield-postpones-phaseout; Meat Poultry, "High hog production costs lead to loss at Smithfield," June 16, 2009, *available at* https://www.meatpoultry.com/articles/1056-high-hog-production-costs-lead-to-loss-at-smithfield.

[168] TF-P-001528551–556 at 555.

[169] JBS, "International Conference Call JBS 4th Quarter 2009 Earnings Release," Mar. 8, 2010, pp. 17–18.

[170] TF-P-001122856.

[171] TF-P-001718524–543 at 533.

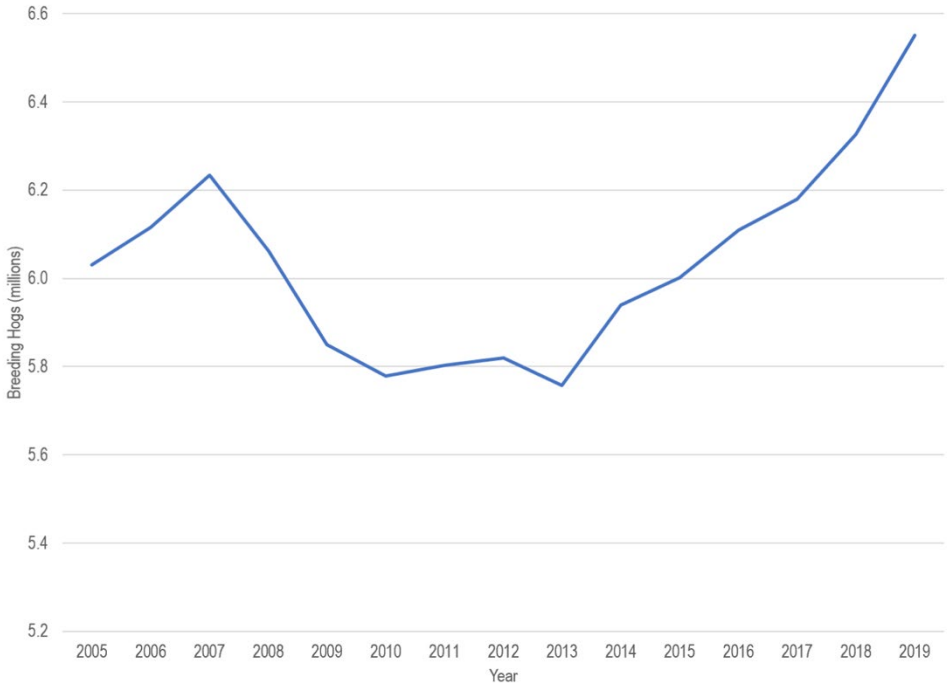
[172] Dale Miller, "Industry's Stimulus Package - Cull Sows," *National Hog Farmer,* Mar. 15, 2009, https://www.nationalhogfarmer.com/marketing/0315-industrys-stimulus-package.

[173] *Id.*

[174] Mark Greenwood, "Costs Drop but Losses Continue," *National Hog Farmer,* Aug. 3, 2009, https://www.nationalhogfarmer.com/images/0903-costs-drop-losses-continue.

79. Defendants made periodic cuts to their domestic sow herds after 2009, which meant that the domestic sow herds controlled by Defendants did not fully rebound until much later. **Figure 14** shows that, following its peak prior to the Conspiracy Period, the U.S. sow breeding herd inventory decreased and remained at lower levels until increasing again in 2014. The inventory did not return to pre-2009 levels until 2016.

Figure 14. U.S. Breeding Herd Inventory[175]



2. Reduced Hog Slaughter

80. Defendants dominated the pork packing market, accounting for just under 90% of the slaughter capacity.[176] As I explain in further detail in **Section III. A. 1.** below, Defendants' control of the pork packing market enabled them to control the upstream hog market since hog growers had no alternative customers. This means that, even if the supply of hogs increases (i.e., if non-Defendant hog growers increase output), unless Defendants increased their slaughter, it may lead to lower hog prices (because growers will be forced to sell), but not to increased output. After Larry Pope touted the "double-digit margins" the industry was experiencing in late 2011

[175] USDA, "Quick Stats," *available at* https://quickstats.nass.usda.gov/AB538EEB-5AE6-3B3D-847F-6389CE507C06?long_desc__LIKE=#D624A5FC-58BD-3915-AABD-C17B7EA68974. See backup production.

[176] See **Section III. A. 1.** below.

following the aforementioned cuts, Robert Manly (Smithfield's CFO) suggested that such enormous returns would "attract capital" and lead to expansion.[177] However, Pope responded by emphasizing that a) "we are not going to build a new plant to expand capacity," and b) barriers to entry are so large that any outsider expansion or entry would not be able to happen for multiple years (due to the time and cost associated with building a new facility).[178]

81. While hog production expanded in the years following Defendants' cuts, Larry Pope's assertions that capacity increases would be slow to arrive proved correct, as Defendants did not increase slaughter capacity until the 2017–2018 period.[179] Following Defendants' major cuts, U.S. pork production fell well below its peak levels for several years. Total production in 2014 was muted somewhat by the PEDv outbreak. While Defendants did not cause the PEDv outbreak, their cuts to production in the preceding years magnified its impact. Following PEDv, pork production continued along the same trend as it did from 2009-2013, before sharply increasing in 2018-2019 with the opening of several new packing facilities.[180] The U.S. population grew consistently through this entire period, and Meyer and Goodwin emphasized that domestic demand for pork "increased nicely."[181]

3. Increased Exports

82. Other things equal, the combination of steadily increasing population and increasing domestic demand for pork should lead to a steady increase in the amount of pork available to U.S. purchasers. As shown previously in **Figure 12**, pork exports were increasing in the early and mid-2000s, and then spiked in late 2007 and early 2008. This sharp increase was due to increased demand in China in connection with the 2008 Olympics, which reportedly accounted

[177] TF-P-001193285–301 at 295.

[178] *Id*. I discuss barriers to entry in more detail later in this report.

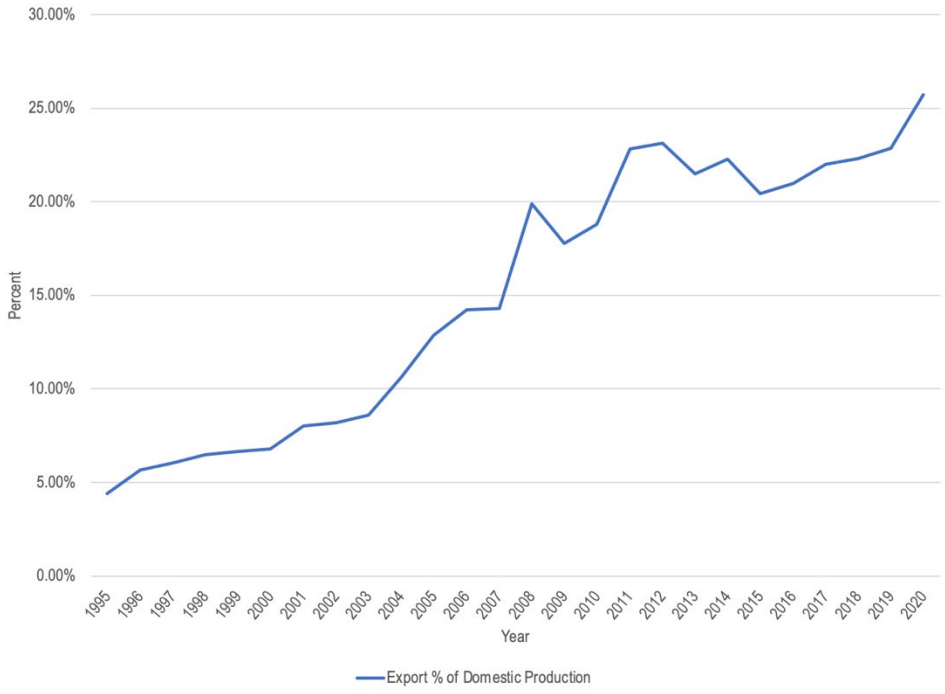
[179] In 2017 and 2018, Clemens opened a new facility, as did Seaboard and Triumph through their joint venture STF.

[180] I note that, while these new facilities opened, Steve Meyer explained that the existing facilities could have processed more pork. In June 2018, after noting that STF's new facility would be holding off on adding a second shift, Meyer stated that the industry has "enough capacity to handle it, but there are more hogs out there than folks have planned to process at this [sic] plants. . . . If the plants aren't ready, that put more hogs on the market." J. Deyoung, "Pork packing capacity faces delays to growth," *Iowa Farmer Today,* June 15, 2018, https://www.agupdate.com/iowafarmertoday/news/livestock/pork-packing-capacity-faces-delays-to-growth/article_f86fde7e-64dc-11e8-b288-475ac8083072.html. In other words, Defendants were not processing as much pork as they could, and they were instead concerned about uncontracted hogs lowering prices for pork.

[181] Meyer and Goodwin, "Structure and Importance of the U.S. Pork Industry," p. 22.

for 7% of all U.S. pork production in the first half of 2008.[182] Following the Olympics, pork exports decreased (relative to 2008) to still-substantial levels in 2009, before growing markedly for several years. After declining slightly during 2013–2015, exports again rapidly increased. Overall, exports as a percentage of production grew at an average rate of 3.69% per year from 2009 2010 to 2020.[183] Pork imports, which are a much smaller amount than exports (see **Figure 12** above), declined by 0.78% per year as a percent of supply over the same 12 years.[184] Notably, pork exports have not grown solely in the absolute sense—they have also grown as a share of total domestic commercial production. As shown in Figure 15 below, exports as a share of total domestic commercial pork production increased dramatically over the relevant period.

Figure 15. Pork Exports as a % of Total Domestic Commercial Production[185]



[182] National Hog Farmer, "Recession May Help Pork Producers Survive," *National Hog Farmer,* Dec. 23, 2008, https://www.nationalhogfarmer.com/marketing/news/recession-helping-producers-1223; Joel Haggard, "China: Hot Summer, Olympics, Slow Pork Consumption Amid Industry Expansion," U.S. Meat Export Federation, Aug. 13, 2008, https://www.usmef.org/news-statistics/press-releases/china-hot-summer-olympics-slow-pork-consumption-amid-industry-expansion-14473/.

[183] See backup production.

[184] See backup production.

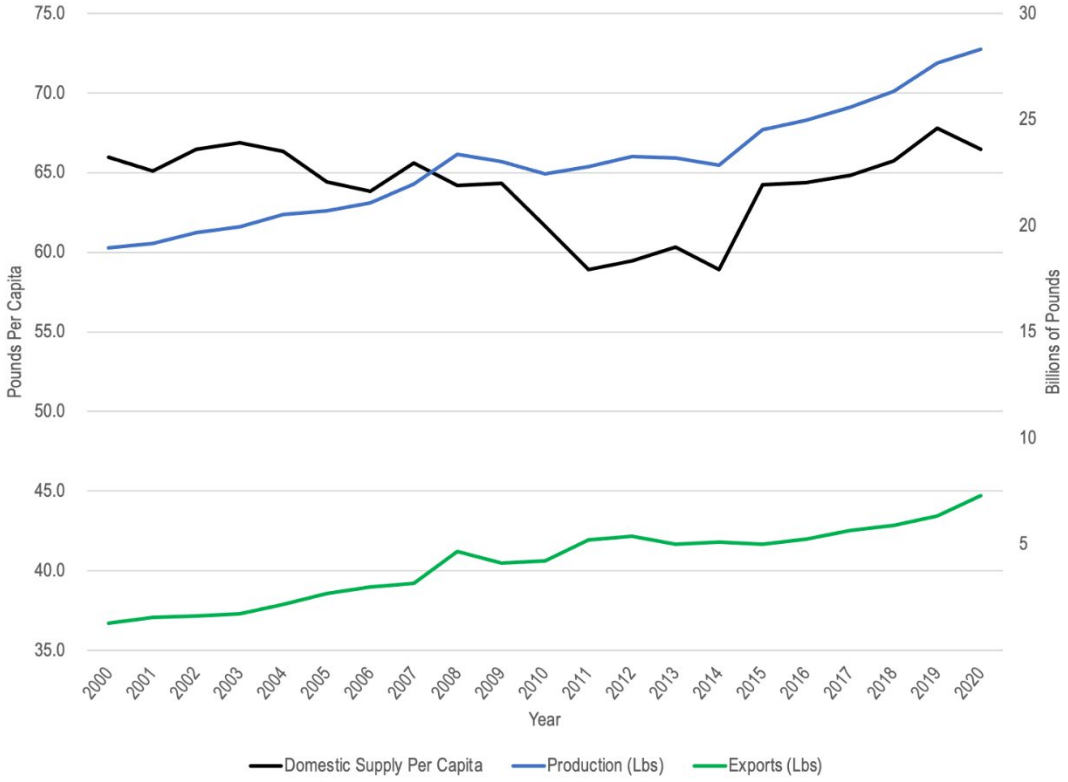
[185] *USDA Meat Supply and Disappearance*.

83. Although **Figure 12** and **Figure 15** demonstrate that exports were growing significantly, both in absolute terms and as a share of total production, they do not fully capture the impact on domestic production, because they ignore growth in the U.S. population. **Figure 16** below addresses this by expressing production in terms of the total pounds of pork available to U.S. consumers. While total domestic production has increased since 2015, pork exports have increased so much that the amount of pork available on a per capita basis has remained largely flat. The fact that pork availability, on a per capita basis, remained below its pre-Conspiracy Period levels until 2018[186] is at odds with Meyer and Goodwin's observation that pork demand has increased over the same time period:[187] U.S. consumers have demanded more pork, and been willing to pay higher prices for pork, but Defendants have increasingly elected to export it instead. By increasing exports relative to demand, Defendants have lowered the supply of pork domestically. As a matter of economics, this leads to higher prices paid by DPPs for the pork that remained in the U.S. marketplace.

[186] See backup production. The average for domestic commercial supply per capita from 2000–2008 was 65.3 pounds per capita, 2018 was the next year that reached above this amount at 65.7 pounds per capita.

[187] Meyer and Goodwin, p. 22.

Figure 16. Domestic Pork Supply[188]



G. Direct Purchasers of Pork Products

84. The proposed DPP Class consists of thousands of entities that purchased pork directly from Defendants during the Class Period. Indeed, Defendants' sales records show sales of pork to thousands of DPPs in the United States, all of which can readily be identified in Defendants' transaction data. At the direct purchaser level, major customer "types" would include wholesalers, retailers, foodservice distributors, and further processors.

Wholesalers

85. Wholesalers and wholesale distributors purchase large volumes of pork and resell it to retailer customers, restaurants, further processors, and end users. Examples of wholesalers in Defendants' sales records include Associated Wholesale Grocers, C&S Wholesale, Costco, Sam's Club, and TopCo.

[188] *USDA Meat Supply and Disappearance.*

Retailers

86. Retailers primarily purchase pork that is resold to end users like consumers. Retailers would include supermarkets, grocery stores, mass merchandisers, discount outlets, and convenience stores. Some of Defendants' major customers in this arena would include massive national chains like Walmart, Kroger, Publix, and Albertsons, but Defendants' records also include many smaller grocery chains and independent retailers. I note that some customers may act as both a retailer and a commercial food preparer (or further processor). For example, even if most of its pork is purchased for resale, a supermarket may offer prepared pork products through its lunch counter or hot deli.

Foodservice Distributors

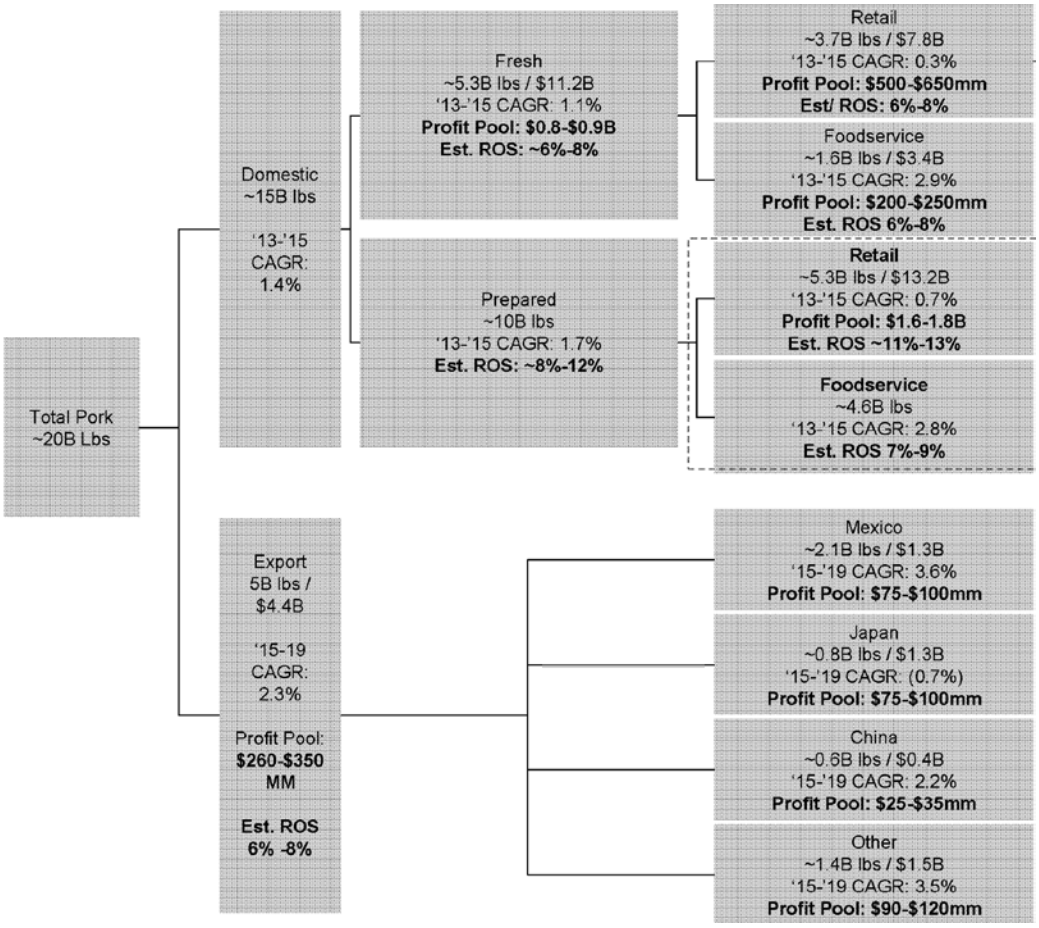
87. Foodservice distributors purchase pork for resale to restaurants and other commercial food preparers, such as casinos, resorts, schools, amusement parks, theaters, stadiums, and other venues. Some food service distributors, such as Sysco and US Foods, serve large customer bases on a national scale. However, there are also many foodservice distributors that operate on a smaller (e.g., regional or local) level.

Further Processors

88. Further processors purchase pork as an input into their own products. Simple examples of further processors would include companies that purchase raw pork belly in order to make bacon, or companies that purchase raw pork in order to make deli meat. Examples of such purchasers would include Bar S Foods and Boar's Head, both of which purchased millions of dollars of pork from nearly all Defendants. Further processing could also include specialty shops (e.g., butchers), which purchase large whole cuts of pork, and then prepare specialized retail cuts for their own customers.

89. While most customers purchase a variety of pork products, sales of different cuts are not equal across sales channels. A 2015 Tyson presentation depicts the pork market from a sales perspective. As seen in **Figure 17**, total domestic pork (i.e., total pork after removing exports) can be separated broadly into "fresh" and "prepared" products. Sales of fresh pork lean decidedly toward retail outlets relative to foodservice, while the split is more even for prepared products. As also shown, the export channel accounts for a very large share of total pork.

Figure 17. Overall Pork Market Structure[189]



90. The fresh pork sales market can be further broken down by primal cut. Bellies are primarily sold to further processors to make bacon.[190] In contrast, ribs, shoulders, and loins are sold more frequently at retail and in foodservice channels, as seen in **Figure 18**.

[189] TF-P-001385600–671 at 620.

[190] *See, e.g.,* SBF0727646; SBF0727647 (sheet "Sales Results"); TF-P-001385600–671 at 670.

Figure 18. Pork Primal Sales by Channel[191]

Fresh Pork
~5.3B lbs

Fresh Pork Market Volumes CY 2015

	Retail	Foodservice	Total
Fresh Ground Pork	73	25	98
Ham/ Leg	5	38	43
Loin	2,133	1,071	3,204
Offal Pork	239	11	250
Other Pork	87	47	134
Should/Butt	675	158	833
Side	354	236	590
Value-Added Pork	160	N/A	160
Total Fresh	**3,726**	**1,586**	**5,312**

91. Bacon itself (as opposed to bellies) is sold in large quantities in both foodservice and retail channels and is the second-highest volume prepared pork product sold domestically (after ham), as shown in **Figure 19**.

Figure 19. Prepared Pork Product Sales by Channel[192]

Prepared Pork
~10B lbs

	Retail	Foodservice	Total
Lunchmeat	1,200	204	1,404
Hams	1,159	966	2,125
Bacon	797	1,111	1,908
Pepperoni	51	408	459
Pizza Toppings	--	323	323
Hot Dogs	594	245	839
Breakfast Sausage	411	656	1,067
Smoked Sausage	410	168	578
Fresh Sausage	282	In Smoked	282
Shelf Stable Meat (SPAM/Ham)	180	0	180
Misc. Pork	127	158	285
Breakfast Ham	35	113	148
Refrigerated Dinner (Ribs/Roasts/Pullec	62	287	349
Cocktail Links	32	--	32
Pork Rinds	29	--	29
Total Prepared Pork	**5,368**	**4,639**	**10,007**

[191] TF-P-001385600–671 at 671. Bellies are omitted from this chart because they are almost entirely sold to further processors. *See* SBF0727646.

[192] TF-P-001385600–671 at 671; JBS-PORK-00340686 (the category "Misc" appears to be additional retailers and foodservice operators, such as Costco and Reinhart).

92. Given the Class definition, my analysis relates largely to sales of fresh pork, with bacon being the only "prepared" product.

III. ECONOMIC EVIDENCE COMMON TO THE CLASS IS CONSISTENT WITH ALLEGATIONS OF DEFENDANTS' COLLUSIVE CONDUCT

93. When studying whether Defendants' alleged conspiracy impacted the prices that DPPs paid, I considered characteristics of the pork packing market itself, as well as Defendants' behavior and performance.[193] In this section, I examine whether there exists common economic evidence supporting the existence of the alleged conspiracy. More specifically, I consider whether the market structure for pork is conducive to the creation and maintenance of a conspiracy. I also reviewed the characteristics of the pork market, and the degree of control Defendants collectively possessed; whether pork is a commodity or commodity-like product; and whether there are mechanisms that would facilitate the implementation and enforcement of the alleged conspiracy. As I explain in detail below, the characteristics of the pork packing industry are conducive to the successful implementation and execution of the alleged conspiracy. In addition, as explained in this section, my econometric analysis demonstrates that prices during the relevant period cannot be explained by non-conspiratorial supply and demand factors alone.

A. Characteristics of the Pork Packing Market Facilitated the Success of the Alleged Conspiracy

94. In this section, I discuss and evaluate how characteristics of the pork packing market during the relevant time period facilitated the formation, survival, and effectiveness of Defendants' alleged conspiracy. In other words, I address how the nature of the pork industry not only facilitated Defendants' alleged conspiracy, but also increased the likelihood that such a conspiracy would be successful (i.e., the alleged conspiracy would result in widespread impact to the Class).

[193] It is my understanding that DPPs have alleged claims that fall under a per se standard of antitrust review, and thus it is not necessary to formally define a "relevant market" in this case. For clarity throughout, however, I refer to the "pork packing market" and "pork packing industry" as the slaughter, processing, packaging, and selling of pork products.

1. The Pork Packing Market Is Highly Concentrated and Dominated by Defendants

95. For a cartel to successfully implement an agreement, the members must possess sufficient market power, i.e., the ability to influence prices.[194] A conspiracy is less costly to create and maintain, all else equal, when there are few participants in the potentially cartelized market, or when a small number of firms in that market collectively have a large market share. The higher the number of participants, the more difficult it is to reach consensus and coordinate behavior, all else equal. As the U.S. Department of Justice ("DOJ") states in the context of seller cartels: "Collusion is more likely to occur if there are few sellers. The fewer the number of sellers, the easier it is for them to get together and agree on prices, bids, customers, or territories. Collusion may also occur when the number of firms is fairly large, but there is a small group of major sellers and the rest are 'fringe' sellers who control only a small fraction of the market."[195]

96. In this case, the number of alleged conspirators is low; other things equal, this benefits the cartel's formation and maintenance. An important indicator of a cartel's ability to influence prices is the market share controlled by the cartel's participants. When the cartel participants have a high collective market share, it is difficult for non-participants in the cartel to undermine its effectiveness. As discussed below, the market for pork is collectively dominated by Defendants.

97. Smithfield and JBS both made major acquisitions in the years before and since the start of the alleged conspiracy, while Seaboard and Triumph have also expanded their joint footprint. Smithfield is the largest packer in the pork industry, controlling 31% of packing and 15–20% of hog production.[196] Smithfield's status as a market leader has come, in part, through numerous mergers and acquisitions over the past decades. For example, Smithfield merged with or acquired: "Carroll Farms in 1990, Murphy Farms in 1994, Farmland Foods in 2003 and Premium Standard Farms in 2007."[197] During the Conspiracy Period, Smithfield acquired

[194] Dennis Carlton, and Jeffrey Perloff, *Modern Industrial Organization,* 4th ed. (Chicago, IL: Addison Wesley, 2005) ("Carlton and Perloff"), p.131.

[195] USDOJ, Antitrust Division, "Price Fixing, Bid Rigging, and Market Allocation Schemes: What They Are and What To Look For," Feb. 2021, https://www.justice.gov/atr/file/810261/download, p. 5.

[196] Wise and Trist, 2010, pp. 5 and 7; SMITHFIELD01285587–647 at 621 (2015 estimate is 15%).

[197] Wise and Trist, 2010, p. 6.

some of Hormel's swine operations, including sow facilities, Clougherty Packing, and Farmer John.[198]

98. JBS is currently the 2nd largest global and domestic producer of pork products.[199] JBS entered the U.S. pork market through its acquisition of then-major pork industry player Swift in 2007.[200] In 2014, JBS controlled just over 11% of the slaughter capacity in the United States, but its share rose to 20% after acquiring Cargill's operations in 2015.[201]

99. Defendants Seaboard and Triumph have worked together for many years and have been the source of increased concentration in the pork packing industry. According to its website, Triumph was established in 2003 "by a group of the largest U.S. independent pork producers."[202] It is my understanding that the original members of Triumph were primarily hog growers, and that they established the company to become more vertically integrated through a large-scale packing operation.[203]

100. While in theory, the establishment of Triumph was an expansion of the number of large packers in the pork industry, in practice, however, its entry into the packing market only increased consolidation within the industry. As discussed previously, in 2004, before its packing plant

---

[198] I understand that Champ, LLC, Clougherty packing, and PFFJ were purchased by Smithfield from Hormel in 2017. MarketScreener, "Smithfield Foods, Inc. completed the acquisition of Clougherty Packing, LLC, PFFJ, LLC and Champ, LLC from Hormel Foods Corporation," Jan. 3, 2017, https://www.marketscreener.com/quote/stock/HORMEL-FOODS-CORPORATION-12977/news/Smithfield-Foods-Inc-completed-the-acquisition-of-Clougherty-Packing-LLC-PFFJ-LLC-and-Champ-LL-35236577/.

[199] JBS, "Our Business," accessed Dec. 30, 2021, https://jbsfoodsgroup.com/our-business; JBS, "Our Locations," accessed Feb. 15, 2022, https://jbsfoodsgroup.com/locations/united-states.

[200] Wise and Trist, 2010, p. 6; Rogerio Jelmayer, "Brazil's JBS buys Swift Foods for $1.4 bln," *MarketWatch,* May 29, 2007, https://www.marketwatch.com/story/brazils-jbs-buys-swift-foods-for-14-bln; Rogerio Jelmayer, "Brazilian Beef Producer JBS Agrees to Acquire Swift Foods," *Wall Street Journal,* May 29, 2007, https://www.wsj.com/articles/SB118044010182517037; Karen Blankfield, "JBS: The Story Behind the World's Biggest Meat Producer," *Forbes,* May 9, 2011, https://www forbes.com/sites/kerenblankfeld/2011/04/21/jbs-the-story-behind-the-worlds-biggest-meat-producer/?sh=334ec6627e82; Elzio Barreto, "Brazil's JBS-Friboi to buy Swift for $225 mln," Reuters, May 29, 2007, https://www.reuters.com/article/us-swift-friboi/brazils-jbs-friboi-to-buy-swift-for-225-mln-idUSN2930167420070529.

[201] For Spring 2013, daily U.S. slaughter capacity was estimated at 50,000 (Swift) ÷ 447,920 (total USA) = 11.2%; for Fall 2016, 89,800 (JBS) ÷ 451,920 = 19.9%. *See* Pork Checkoff, "Pork Stats 2014," Nov. 21, 2014, *available at* https://texas4-h.tamu.edu/wp-content/uploads/Pork-Facts.pdf; Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Aug. 9, 2017, *available at* https://www.porkcdn.com/sites/porkorg/library/2015/12/estimated_daily_u.s._slaughter_capacity_by_plant_hpd.pdf.

[202] Triumph, "Triumph's Story," accessed Dec. 23, 2021, https://www.triumphfoods.com/triumphs-story/.

[203] *Id. See also* Seaboard Triumph Marketing Agreement, Feb. 2, 2004 (SBF0054466–580).

had even been constructed, Triumph formed a "strategic alliance" with Seaboard, another existing packer.[204] Pursuant to the "strategic alliance," a) Triumph was responsible for the maintenance of its pork processing plant in St. Joseph, Missouri, and b) Seaboard was responsible for marketing and selling any pork produced there, as well as ultimately determining how much pork was produced.[205] I further understand that, under the agreement, Seaboard and Triumph split revenues on a pro-rata basis from Seaboard's combined pork sales from Triumph's plant and Seaboard's own plant.[206]

101. Throughout most of the relevant time period, Seaboard and Triumph (together) controlled approximately 9% of the packing capacity.[207] However, in May 2015, Seaboard and Triumph established STF, a new joint venture through an amendment to the original agreement.[208] Specifically, according to the amendment, the new company, owned 50% by Seaboard and 50% by Triumph, was formed for the purpose of constructing a new pork processing plant in Sioux City, Iowa.[209] STF's new pork processing plant opened in 2017 and increased capacity further in 2018–2019.[210] With the new STF venture, Seaboard and Triumph collectively controlled 12.5% of the packing market by 2020.[211] As seen in **Figure 20** below, Defendants and co-conspirator Indiana Packers controlled between 86% and 88% of the packing capacity during the Conspiracy Period. The individual market shares have varied slightly over time—in large part due to acquisitions by and among Defendants. Like Seaboard and Triumph,

---

[204] *See* Seaboard Triumph Marketing Agreement, Feb. 2, 2004 (SBF0054466–580 at 471 and 479).

[205] *Id.*

[206] Seaboard Triumph Marketing Agreement, Feb. 2, 2004 (SBF0054466–580).

[207] The 2014 Pork Checkoff report shows Triumph with capacity to slaughter 20,000 head per day in 2012–2013, while Seaboard's capacity is at 19,800 each year, for a total of 39,800. With US totals of 442,380 and 447,920 in 2012 and 2013, respectively, Seaboard and Triumph held collectively 9% in each year. *See* Pork Checkoff, "Pork Stats 2014," Nov. 21, 2014, *available at* https://texas4-h.tamu.edu/wp-content/uploads/Pork-Facts.pdf.

[208] *See* SBF0054466–580 at 531.

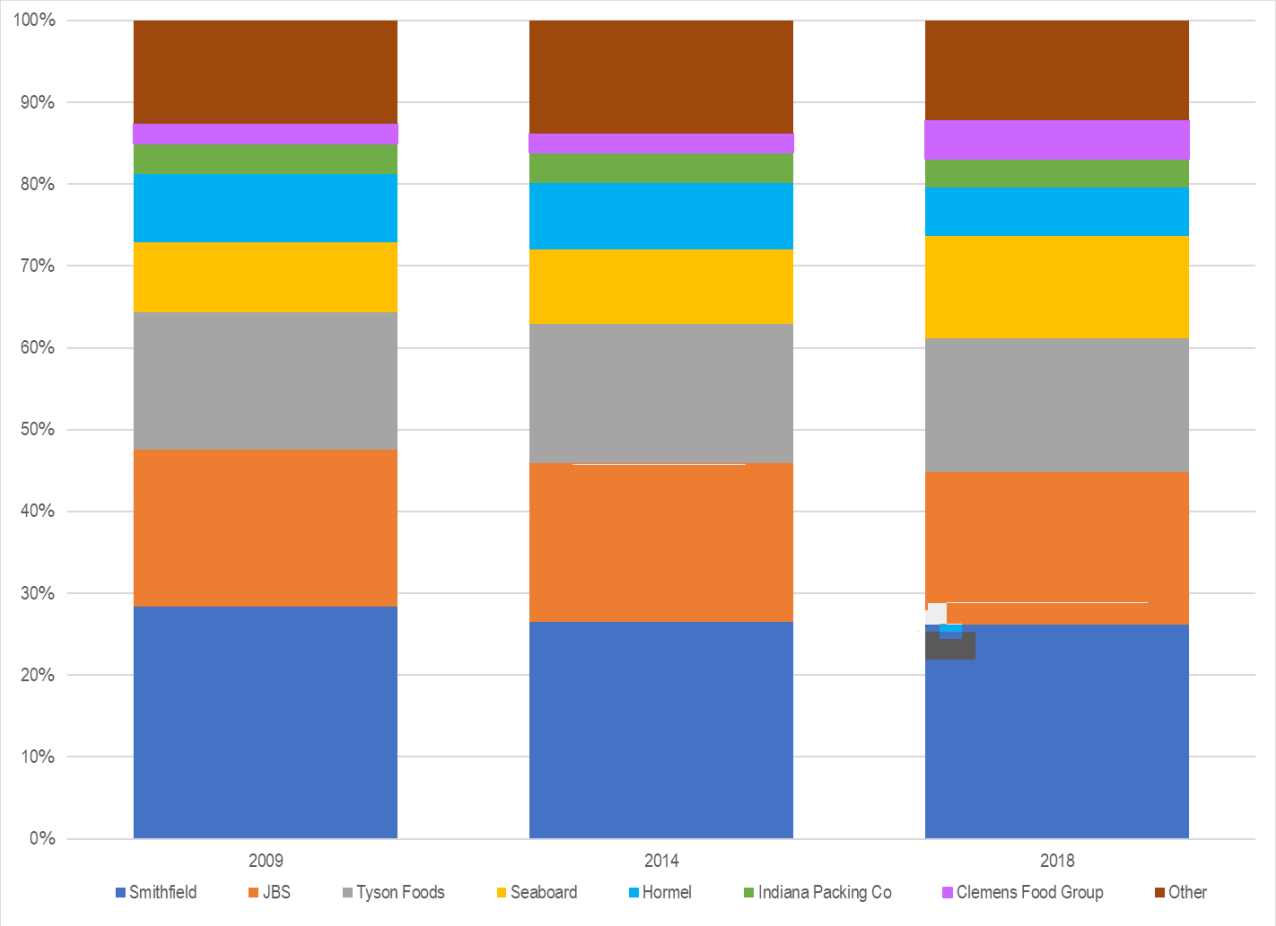
[209] *Id.*

[210] Kerns and Associates reported in its "estimated daily slaughter capacity" that STF's initial capacity was 10,200 head per day in 2017 and would rise to 20,400 per day in 2018. Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Sept. 17, 2018. However, based on comments from Steve Meyer (of Kerns and Associates), it appears the increased capacity did not materialize by that point in time. According to Mr. Meyer, STF "had hoped to start a second shift" in 2018, but that "the second shift is being pushed back to 2019." J. Deyoung, "Pork packing capacity faces delays to growth," *Iowa Farmer Today,* June 15, 2018, https://www.agupdate.com/iowafarmertoday/news/livestock/pork-packing-capacity-faces-delays-to-growth/article_f86fde7e-64dc-11e8-b288-475ac8083072.html.

[211] Meyer and Goodwin report their joint share to be 12.5% in 2020. That is, (22,500 + 21,300 + 20,400) ÷ 512,370 = 12.5%. Meyer and Goodwin, p. 10.

Clemens also increased its market share through the opening of a new facility late in the Conspiracy Period (2.6% in 2016 to 4.9% in 2017).[212] As shown below, these shifts in share have largely come at the expense of Hormel (6%–8%) and Tyson (17%–18%).

Figure 20. Slaughter Capacity by Year[213]



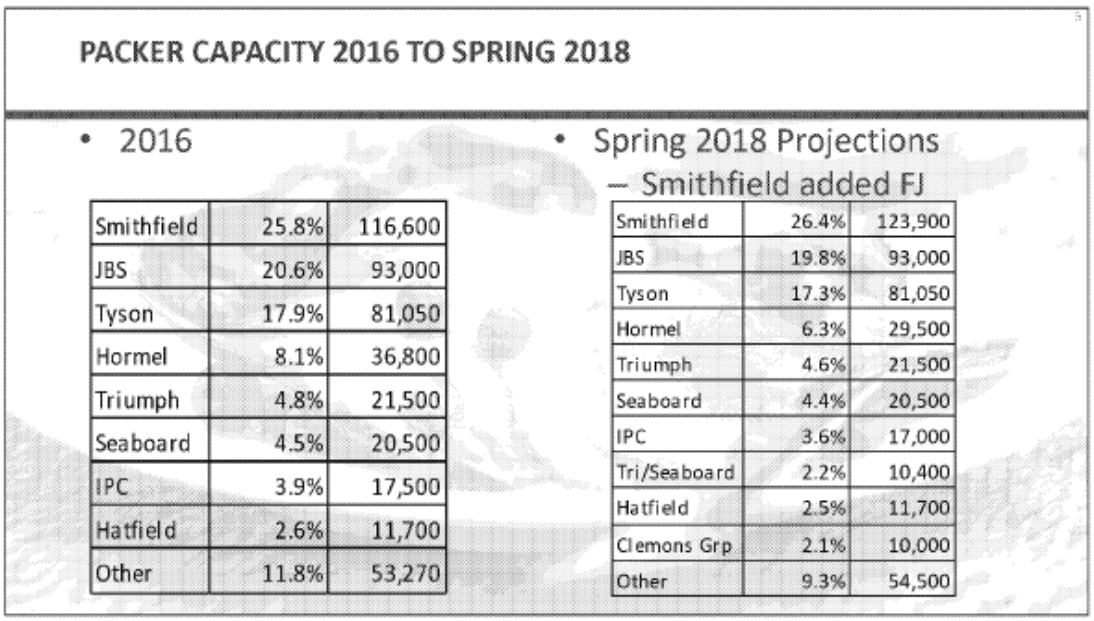
102. Defendants and co-conspirators own and operate nearly all major U.S. packing facilities. By 2019, capacity lists show that Defendants occupied the top eight, with co-conspirator Indiana

[212] Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Aug. 9, 2017, *available at* https://www.porkcdn.com/sites/porkorg/library/2015/12/estimated_daily_u.s._slaughter_capacity_by_plant_hpd.pdf.

[213] In this figure, "Seaboard" includes Seaboard, Triumph, and STF. See the estimated daily U.S. slaughter capacity in the Pork Checkoff publications. Pork Checkoff, "Quick Facts: The Pork Industry at a Glance," *available at* https://porkgateway.org/wp-content/uploads/2015/07/quick-facts-book1.pdf; Pork Checkoff, "Pork Stats 2014," Nov. 21, 2014, *available at* https://texas4-h.tamu.edu/wp-content/uploads/Pork-Facts.pdf; Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Aug. 9, 2017, *available at* https://www.porkcdn.com/sites/porkorg/library/2015/12/estimated_daily_u.s._slaughter_capacity_by_plant_hpd.pdf; Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Sept. 17, 2018.

Packers in ninth.[214] Although there are numerous small packing facilities outside of those owned by Defendants, they are largely "fringe" entities that do not possess the economic footprint necessary to meaningfully discipline Defendants. To illustrate the gap between the major players and fringe competitors in the pork packing industry, consider Indiana Packers (17,300 head per day) had only about 13% of the daily capacity of Smithfield in 2019, but it still had over 60% more capacity than the next-largest packer (Wholestone Foods, 10,675 head per day).[215] The Smithfield document seen in **Figure 21** shows slaughter capacity by packer, and declines to even identify fringe competitors by name—lumping them together into an "Other" category (with less than 12% of the market in 2016 and less than 10% expected in 2018).[216]

Figure 21. Slaughter Capacity by Company (Smithfield)[217]



PACKER CAPACITY 2016 TO SPRING 2018

- 2016

Smithfield	25.8%	116,600
JBS	20.6%	93,000
Tyson	17.9%	81,050
Hormel	8.1%	36,800
Triumph	4.8%	21,500
Seaboard	4.5%	20,500
IPC	3.9%	17,500
Hatfield	2.6%	11,700
Other	11.8%	53,270

- Spring 2018 Projections
  - Smithfield added FJ

Smithfield	26.4%	123,900
JBS	19.8%	93,000
Tyson	17.3%	81,050
Hormel	6.3%	29,500
Triumph	4.6%	21,500
Seaboard	4.4%	20,500
IPC	3.6%	17,000
Tri/Seaboard	2.2%	10,400
Hatfield	2.5%	11,700
Clemons Grp	2.1%	10,000
Other	9.3%	54,500

[214] Meyer and Goodwin, p. 10. Charts for earlier years show similar levels of control. *See, e.g.,* Pork Checkoff, "Pork Stats 2014," Nov. 21, 2014, *available at* https://texas4-h.tamu.edu/wp-content/uploads/Pork-Facts.pdf; Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Aug. 9, 2017, *available at* https://www.porkcdn.com/sites/porkorg/library/2015/12/estimated_daily_u.s._slaughter_capacity_by_plant_hpd.pdf.

[215] Meyer and Goodwin, p. 10. *See, e.g.,* CLMNS-0000615407, p. 2 (where the same "drop off" in market share is readily visible).

[216] SMITHFIELD03005050–5057 at 5054.

[217] Recall that Hatfield and Clemens are one Defendant. The Clemens Group entry in the table refers to Clemens' new facility that opened in the 2017-2018 timeframe, so from a Defendant market share perspective these should be combined.

103. While mergers, changes in ownership, and acquisitions in the pork packing industry led to some shifting of individual Defendant's market shares, their collective control of the packing industry has not varied meaningfully. The shares shown in **Figure 20** are consistent with other documents and information in the record. Numerous Defendant documents, as well as publicly available information, confirm that Defendants controlled well over 80% of the pork packing market during the relevant timeframe. For instance, a presentation prepared by McKinsey and Company for Tyson notes that, compared to the broilers (chickens) industry, the pork industry has "heavily concentrated" "supply economics."[218]

104. Tyson's market share estimates in 2009 and 2012 showed that Defendants and co-conspirator Indiana Packers controlled 64% and 72% of the market, respectively,[219] and a 2014 presentation produced by Agri Stats shows that in 2014, Defendants and Indiana Packers controlled 86% of the packing market.[220] Similarly, a 2016 Smithfield document shows Defendants (with Indiana Packers) controlling 88.2% of the packer capacity,[221] and the same document projects that, by 2018, the same group of companies would control over 90%.[222]

105. In addition to simply measuring market shares, one measure of industry concentration often used by economists and government enforcement agencies is the Herfindahl-Hirschman Index, or HHI.[223] In a perfectly competitive market, which is an industry characterized by numerous firms, each with a negligible share of the market, the HHI tends towards the value of zero.[224]

---

[218] TF-P-000134191, p. 20. The precise date of the document is not shown, but given that it refers to information from as recent as September 2016, it is from relatively late in the Conspiracy Period.

[219] TF-P-000525375, p. 4; TF-P-001578110, p. 9. *See also* TF-P-000682020, p. 5. The document includes Seaboard, Triumph, Clemens, and Indiana Packers in an "Other" category, but the estimates for Tyson, Smithfield, JBS, and Hormel are consistent with Smithfield's 2016.

[220] (451,520 − 57,495 − 4,800) ÷ 451,520 = 86%. AGSTAT-P-0003384656, p. 110.

[221] SMITHFIELD03005050–5057 at 5054.

[222] *Id*.

[223] USDOJ, Antitrust Division, "Herfindahl-Hirschman Index," USDOJ, July 31, 2018, https://www.justice.gov/atr/herfindahl-hirschman-index.

[224] The HHI is calculated by squaring each firm's market share and summing them up. So, if an industry has 10 firms that each hold 10% of the market, the HHI would be $(10^2 \times 10) = 1{,}000$. To see how the number of firms impacts an industry's HHI, consider an industry that has 100 firms that each hold 1% of the market. The HHI would be $(1^2 \times 100) = 100$. For 200 firms that each hold 0.5% of the market, the HHI would be $(0.5^2 \times 200) = 25$. However, the situation changes considerably if the firms are not all equally sized. Suppose, for example, that there are 100 firms, but that three firms each control 30% of the market, and the remaining 97 control the other 10%. The HHI would be $(30^2 \times 3) + (0.103^2 \times 97) = 2{,}700 + 1.03 = 2{,}701$. In other words, a large number of small firms does not meaningfully reduce the concentration of a market. In fact, if all 97 fringe firms ceased to exist, and the remaining three split the remaining share equally, the HHI would only rise to 3,333.

At the opposite extreme, in an industry where there is only one supplier (i.e., a pure monopoly), the HHI takes the value of 10,000.[225] The DOJ considers markets with HHI between 1,500 and 2,500 to be "moderately concentrated" and markets with an HHI above 2,500 to be "highly concentrated."[226] Using slaughter capacity as a proxy for actual production, I estimated the HHI for the pork packing industry at several points during the Conspiracy Period. As shown in **Figure 22**, the estimated HHI typically falls between 1,500 and 1,700, indicating that the industry is "moderately concentrated." However, this measure does not account for collusion between Defendants. As also shown, if the HHI is re-calculated during the Conspiracy Period to reflect collusion (i.e., calculating the HHI as if all Defendants were a single-entity), the HHI is well over 7,000 as seen in the bottom panel of **Figure 22**.

Figure 22. Pork Packing Industry HHI[227]

Pork Packing HHI, 2009–2018

2009	2014	2018
1,624	1,544	1,533

Pork Packing HHI, 2009–2018 Under Cartel

2009	2014	2018
7,636	7,439	7,721

106. Another measure of concentration—the four-firm concentration or "CR-4" ratio—measures the share of the market held by the four largest firms in an industry. Meyer and Goodwin note that "70 percent is normally considered high concentration," and estimate that the pork packing market's CR-4 ratio "grew from roughly 44 percent in 1995 to just over 70 percent in 2016."[228]

[225] With only one firm, the firm's market share is 100%, and therefore the HHI = 100^2 = 10,000.

[226] USDOJ, Antitrust Division, "Herfindahl-Hirschman Index," USDOJ, July 31, 2018, https://www.justice.gov/atr/herfindahl-hirschman-index.

[227] See the estimated daily U.S. slaughter capacity in the Pork Checkoff publications. Pork Checkoff, "Quick Facts: The Pork Industry at a Glance," *available at* https://porkgateway.org/wp-content/uploads/2015/07/quick-facts-book1.pdf; Pork Checkoff, "Pork Stats 2014," Nov. 21, 2014, *available at* https://texas4-h.tamu.edu/wp-content/uploads/Pork-Facts.pdf; Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Aug. 9, 2017, *available at* https://www.porkcdn.com/sites/porkorg/library/2015/12/estimated_daily_u.s._slaughter_capacity_by_plant_hpd.pdf; Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Sept. 17, 2018.

[228] Meyer and Goodwin, p. 11.

I calculated periodic CR-4 ratios using the same capacity data as I used to calculate periodic HHI estimates. As seen **Figure 23**, the ratio is consistently above 70%.

Figure 23. CR-4 Measure of Pork Packing Industry Concentration[229]

Pork Packing Concentration Ratio (4-Firm)

2009	2014	2018
72.9%	72.0%	73.7%

107. In summary, Defendants collectively control the vast majority of capacity, and common measures of market concentration indicate that Defendants, especially if acting collusively—would wield extraordinary market power. This is important for a conclusion of common impact, because it means that virtually all the pork that DPPs purchased during the Conspiracy Period came from Defendants. In other words, even if a pork customer was aware of a price-fixing conspiracy, it would be difficult, if not impossible, to avoid purchasing Defendants' pork products at all, let alone for the entire duration of the Conspiracy Period.

2. Influence in the Hog Market

108. Defendants are heavily involved in the hog production stage, either through direct ownership and vertical integration, or through buyer power and dominance of the downstream market. Documents and publicly available information indicate that Defendants each own or control large breeding herds—sows—which lead to the production of millions of piglets and, eventually, market hogs, each year. Defendants use a combination of their company-owned herds and supply contracts with hog growers to secure market hogs for their slaughter and packing facilities.

109. As discussed, Defendants control nearly all U.S. packing capacity, which also grants them significant power in the hog market. In addition to their sizeable outright ownership share in the hog market, Defendants collectively have buying power over contract and independent hog

[229] See the estimated daily U.S. slaughter capacity in the Pork Checkoff publications. Pork Checkoff, "Quick Facts: The Pork Industry at a Glance," *available at* https://porkgateway.org/wp-content/uploads/2015/07/quick-facts-book1.pdf; Pork Checkoff, "Pork Stats 2014," Nov. 21, 2014, *available at* https://texas4-h.tamu.edu/wp-content/uploads/Pork-Facts.pdf; Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Aug. 9, 2017, *available at* https://www.porkcdn.com/sites/porkorg/library/2015/12/estimated_daily_u.s._slaughter_capacity_by_plant_hpd.pdf; Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Sept. 17, 2018.

growers, which have very few, if any, options to market their hogs to non-Defendant packers. All things equal, growers facing monopsony or oligopsony conditions will be more likely to accept the buyer's terms of sale.[230] Under normal market conditions with many buyers and many sellers, the "price" is negotiated to competitive levels consistent with supply and demand conditions. However, when there are few buyers—much less when they are acting in concert—the market effectively becomes a monopsony where sellers have no choice but to accept the buyers' terms. Thus, not only do hog growers have limited, if any, options outside of selling to Defendants, but any negotiating power they have would be further restricted due to the nature of their product. Growers cannot simply "store" hogs in lieu of selling, because a) it increases their own costs to keep hogs longer, b) as hogs continue to age and grow, the desirable characteristics in muscle mass and weight will eventually deteriorate, and c) hogs are large and require substantial space to maintain. As the production cycle continues, younger and smaller hogs grow larger, and space becomes a constraint. Further, that hogs are both large and perishable inhibits hog growers' ability to effectively negotiate with Defendants, because transporting the market hogs to another area (with other buyers) is costly and difficult.[231] Lastly, the commodity-like nature of hogs (discussed further in **Section III. A. 3. d.** below) means that a) pork packers can source from any number of growers, and b) growers are competing on price, which severely restricts their negotiating power. Research into the U.S. hog markets shows that Defendants' buying power has grown over time, in concert with their control over the packing market.[232]

110. Vertical integration refers to a situation in which a company "participates in more than one successive stage of the production or distribution of goods or services."[233] A firm that is fully vertically integrated in the pork production market would own all of the swine involved in breeding, farrowing, weaning, finishing, slaughter and packing, and marketing. No Defendant is vertically integrated to that extent because they all rely on external hog growers for some portion of their hog supplies. However, all Defendants exhibit some degree of vertical

[230] Wise and Trist, p. 8.
[231] Wise and Trist, p. 8.
[232] Wise and Trist, pp. 4–7.
[233] Carlton and Perloff, p. 395.

integration, as they own relatively large sow herds that produce piglets which are finished for their own use.

111. While Defendants' share of the hog market (by ownership) is lower than in the packing market, Defendants nevertheless represent "the only game in town" for growers seeking to market their hogs. Just because some packers, like Tyson, rely on numerous independent growers does not eliminate, or necessarily even lessen, their degree of control or influence in the markets in question. Carlton and Perloff explained that even when firms do not vertically integrate, they "often write complex contracts that restrict the actions of those with whom they deal. These vertical restrictions can approximate the outcome from vertically merging."[234] This is precisely how Defendants deal with "independent" hog growers. For example, contracts between Defendants and growers specify the volume of hogs to be delivered, pricing terms, and production schedule, but also burden the grower with restrictions regarding feed, veterinary care, health of hogs at delivery, quality of hogs (including yields, grades, Iodine values, and other measures of quality), handling and treatment of animals, transportation, and inspection and review of operations.[235] Defendants' extensive use of contracts that include a wide variety of vertical restrictions grant them a degree of control over the hog supply beyond what their individual shares in the hog market suggest.

112. The expanded use of hog contracts—rather than spot market pricing—has further increased Defendants' control of the upstream and downstream market.[236] As I discuss later in this report, the extensive use of contracts also amounts to a barrier to entry for would-be packers.

---

[234] Carlton and Perloff, p. 395.

[235] *See, e.g.,* TF-P-002264639–642 (2010 amendment to the 2009 Hog Procurement Agreement between Tyson and Prestage Farms of Iowa, LLC); HFC-PORKAT0000047054–7071 (2011 Hog Procurement Agreement between Hormel and The Maschhoffs, LLC); SMITHFIELD01121927–929 (2011 Market Hog Supply Agreement between Farmland Foods Inc. (Smithfield) and The Maschhoffs, LLC); SMITHFIELD03619652 (2013 amendment to a 2012 Market Hog Supply Agreement between Farmland Foods, Inc. (Smithfield) and Prestage Farms); PFI00005090–111 (2013 draft Hog Procurement Agreement between Triumph and Prestage Farms of Iowa, LLC); TRI0000387004–7036 (undated draft Hog Procurement Agreement between Triumph and The Maschhoffs, LLC); HFC-PORKAT0000047101–137 (2012 draft Hog Procurement Agreement between Hormel and Next Generation Pork); HFC-PORKAT0000047424–457 (2010 draft Hog Procurement Agreement between Hormel and MGM, LLC); JBS-PORK-00220947–981 (2014 Hog Purchase Contract between JBS and Silver Lake Pork, Inc.); SBF1096303–319 (2016 Independent Contractor Agreement between Seaboard and Christensen Farms & Feedlots. This agreement also indicates that the seller was under contract with Tyson and JBS and outlines details of performing under contractual obligations from all three Defendants.); SBF0258716–775 (2010 Market Hog Purchase Agreement between Seaboard and Prestage Farms of Oklahoma, LLC).

[236] Wise and Trist, pp. 11–12.

That is, Defendants either own or own contractual rights to all the hogs, which makes it more difficult for a new entrant to successfully compete in the packing segment.

113. Defendants' control of the upstream hog market—either through vertical integration or through leverage as an oligopsony—is a factor that would facilitate the creation and success of the alleged conspiracy. Specifically, through extensive ownership of sow and hog herds, Defendants are able to directly control or exert influence on the number of hogs that ultimately come to market. For example, Defendants are alleged to have made large cuts to the size of their sow herds early in the Conspiracy Period, which, other things equal, would lead to a subsequent decrease in the number of farrowings, piglets, and ultimately the number of hogs brought to market. Other things equal, fewer hogs being brought to market equates to a reduction in pork production, which would lead to increased prices for pork products in the marketplace.

114. Where Defendants' operations are vertically integrated, reducing the number of hogs that come to market is fully within their control through decisions about breeding stock, the number or frequency of farrowings, the number of piglets retained, and the timing of slaughter. Even where Defendants are not vertically integrated (i.e., do not own all sows or hogs), the nature of their contracts with hog growers still allows them to exert influence on the number of hogs raised over a relatively short period of time. For example, many Defendant-grower contracts are for relatively short time periods, or allow for termination with relatively short notice (often one year, though sometimes less).[237] Such contracts allow Defendants to adjust the quantity of hogs they slaughter outside of adjustments to their own herds.

115. As explained by Wise and Trist, Smithfield's aggressive acquisitions during the 1990s and 2000s were accompanied by a shift toward vertical integration. "The company moved to control the entire farm-to-table supply chain, from production, packing, and processing to branding a final retail product."[238] Smithfield's expansive hog operations give it the power to

[237] See, e.g., JBS-PORK-00220315; JBS-PORK-00220552–560; JBS-PORK-00542703–705; JBS-PORK-00541999–2015; TF-P-002253012–3023 (evergreen with18-month termination notice); HFC-PORKAT0000046909 (a 12-month minimum term, with 6 months termination notice); HFC-PORKATC0000291060 (1 month contract).

[238] Wise and Trist, p. 6.

influence both the number of hogs it slaughters for its own pork production, and the number of hogs that are available for sale to other pork packers.

116. Seaboard and Triumph have a high degree of vertical integration. A presentation on the pork marketplace from 2017 indicated that Seaboard was 83% vertically integrated.[239] In 2016, Triumph received nearly 75% of its market hogs from the company's member growers.[240] While Triumph's members are governed by a standard hog production agreement, amendments to that agreement are often made by Triumph's Board of Managers.[241] Further, I understand that Seaboard can indirectly control Triumph's production volume by virtue of their agreement, by which it controls the volume of production at Triumph's plants (subject to the constraint that it does not fall below Seaboard's own production volume).[242] In other words, if Seaboard (as a conspirator) was willing to limit its own production, it would also be able to impose limits on (fellow conspirator) Triumph's production. Further, as the selling entity, Seaboard would have control over marketing decisions for pork produced by Triumph and STF.[243]

117. Regarding Clemens, at least one-third of its hogs are supplied by its own subsidiary (Country View Family Farms ("CVFF")), with the remaining two-thirds coming equally from contract growers and independent growers.[244] Thus, it also has significant control over its supply of hogs.

118. I also note that Defendants appear to be able to re-negotiate hog supply agreements.[245] Further, Defendants' hog agreements often include clauses that allow them—but do not obligate

[239] TF-P-000134191, p. 21.

[240] TRI0000390682, p. 2.

[241] TRI0000419868–870; TRI0000419871; TRI0000479701–754.

[242] SBF0054466–580 at 495–496 (Section 9.02 "Scheduling; Transportation" that notes "SBF shall be directly responsible, acting in a commercially reasonable manner, for scheduling the pork processing operations . . . at the TF Plant to meet customer needs and requirements.").

[243] SBF0054466–580.

[244] CLMNS-0000031669.

[245] Re-negotiated agreements may involve adjustments to hog quantities, pricing, or any other terms. *See, e.g.,* TF-P-001509009; TF-P-000800928–950 (showing that the agreement has been amended numerous times); JBS-PORK-00220320–324 ("First Amendment to Hog Purchase Contract").

them—to purchase hogs in excess of the contracted amounts.[246] This gives Defendants additional leverage over hog growers in the event that hog supplies (for whatever reason) are larger than anticipated in any given period.

3. Commodity-like Nature of Pork Products

119. Economists have recognized that cartels are more likely to form when the products sold by the would-be competitors are homogeneous or commodity-like.[247] When different suppliers in an industry offer similar products, customers are less likely to choose a vendor on the basis of product variety, and are more likely to choose on the basis of price. In a commodity industry, the price that each individual supplier receives—the market price—depends on the cumulative supply decisions of all industry participants, rather than just the supply decisions of that individual supplier. Although an individual supplier often has the incentive to increase production to maximize its own profits, this increased production would reduce the profitability of the industry as a whole. Thus, industries with commodity-like products face an incentive to collectively agree to constrain total supply below what it would be in a competitive market to maximize collective industry profits. As explained by economists Dennis Carlton and Jeffrey Perloff, "Working cooperatively, the cartel members gain from the output reductions of each firm. When all firms belong to the cartel, all the gains from reducing output and raising price go to the cartel, which divides the gains among its members. . . . As a result, it pays the cartel to reduce total output below the competitive level, even though it would not pay any competitive firm to reduce its output individually."[248]

120. Based on the commodity nature of pork products, price levels depend on aggregate supply and aggregate demand. Holding demand constant, any reduction in aggregate supply leads to an increase in price levels. Factoring in that demand increases over time, aggregate supply that does not increase as fast as aggregate demand results in increased price levels. When acting

[246] HFC-PORKAT0000046909–937 (section 3(c) Excess Quantities); HFC-PORKAT0000047424–457 at 425 ("Hogs delivered in excess of the agreed quantity will be accepted only at our sole discretion, and will be priced at the amount we specify"); SMITHFIELD04391680–687 at section 8; TF-P-000800928–950 at 934 ("Tyson at its sole discretion may choose to accept the additional Market Hogs"); TF-P-002252518–530 at section 2.g.; JBS-PORK-01093548–578 at sections 3.01(i)–(ii) (noting the limitations on JBS's obligation to purchase hogs in excess of the contracted amount).

[247] Carlton and Perloff, p. 135.

[248] Carlton and Perloff, p. 125.

independently, a pork packer bears the entire cost of reduced production while the industry as a whole benefits. Thus, absent a conspiracy, packers will be less willing to cut production than in a world where packers have collectively agreed to cut or restrain the growth of production. Unilateral restraints may also be less effective than coordinated restraints that impact industry supply. For example, Robert Manly of Smithfield told investors that Smithfield had "limited ability to [move prices up] ourselves if the rest of the industry doesn't follow."[249] Manly emphasized that the reward for working "collectively as a group" would be increased profits, because "the consumer tends to be willing to pay proportionately higher values for their pork meat when small increments of supply are withdrawn from the marketplace."[250] Therefore, Defendants' alleged conspiratorial supply restrictions would be expected to result in lower output and higher prices than would be achieved absent the alleged conspiracy.

a. Defendants and DPPs Considered Pork a Commodity-Like Product

121. Pork industry participants, including analysts, purchasers, and Defendants themselves, recognized that pork products are commodity products.

122. One way of examining whether pork is a commodity-like product is to look for evidence of switching among or between suppliers. If customers purchase similar products from multiple suppliers (either simultaneously or over time), this can be evidence of interchangeability. Of course, that pork is commodity-like in nature does not necessarily mean that customers will switch suppliers instantly over small differences in price, especially if such differences are expected to be temporary. One reason for this may be that switching vendors involved frictional or transaction costs; another may be contractual obligations to buy only (or primarily) from a certain supplier for a specified period of time.

123. Defendants' transaction data indicates that many customers purchase products from multiple Defendants, often at the same time. Of the twenty largest customers of pork products, fourteen (including the three largest—Walmart, Sysco and Fresh Mark Cold Storage) purchased from every Defendant. In fact, these three merchants had substantial pork purchases from three or

[249] SMITHFIELD01074263–273 at 271. *See also* Complaint, ¶ 158.

[250] SMITHFIELD01074263–273 at 271.In economics terms, Robert Manly is stating that pork exhibits relatively "inelastic" demand. Inelastic demand is often considered a factor that contributes to and facilitates the formation of a cartel.

more Defendants in every month between January 2009 through December 2020.[251] This is not to say that purchasing was equal between Defendants. For example, Walmart's commerce with Seaboard was, on average, 2.3 million pounds of pork a month in 2015, before dropping to less than 1 million pounds of pork per month in 2016. By 2019, Walmart was once again sourcing an average of 2.1 million pounds of pork from Seaboard each month.[252] These changes in purchase volumes are evidence of switching and the substitutability of pork products.

124. This choice to purchase from multiple Defendants interchangeably can be seen for smaller merchants as well. For example, Villari Food, a merchant that purchased just over 12 million pounds of pork , bought from all Defendants except Hormel, sometimes buying thousands of pounds in loin from multiple Defendants in a month, and other times buying all its loin from a single Defendant.[253] Overall, of the customers that purchased more than 10 million pounds of pork from Defendants between 2009 and 2020, 90% bought from more than one Defendant.[254]

125. Another form of evidence that pork is a commodity-like product comes in the way that Defendants and customers referred to pork in their contracts and internal communications. For example, an internal Hormel document repeatedly refers to various pork cuts by their "commodity" number/name.[255] An internal Seaboard email chain related to differences in the prices, costs, and margins for pork products concludes with Brian Taphorn emphasizing that even pork products with some degree of processing (i.e., "value-add"[256]) are still commodity-like in nature ("Let's face it, enhanced pork is a commodity item, in its own right and should be viewed as such.").[257] In his recap of a "Foodservice fresh meat pricing call," Smithfield's

[251] See backup production. "Substantial" here refers to purchases of at least 500,000 pounds of pork.

[252] See backup production.

[253] See backup production.

[254] See backup production.

[255] HFC-PORKAT0000031666. *See also* HFC-PORKAT0000032970.

[256] "Value-add" and "enhanced" are terms that are often used by Defendants to distinguish between "commodity" primal cuts of pork and cuts that have been further processed in some way. In some contexts, "value-add" could refer to extensive and costly processing and cooking; in other contexts, it could mean simply removing a bone from a pork chop. However, as indicated by Mr. Taphorn, the fact that a pork product is classified as "enhanced" or "value-add" does not mean that it is not commodity-like. For example, Hormel's "Always Tender," "Natural Choice," and "Hormel All Natural" branded lines of pork products are each listed under the heading "Commodity" in an internal document from 2009–2010. HFC-PORKAT0000079838, pp. 3–7. *See also* HFC-PORKAT0000373554, pp. 14 and 22.

[257] SBF0145794.

Joe Weber indicated that fresh pork being a commodity item is a "core concept."[258] An internal Tyson email repeatedly refers to a "commodity business model like beef and pork and a variety of others where the market sets the cost of the goods."[259] An internal Triumph report discussing numerous aspects of the pork industry summarizes the point clearly:

> **The wholesale pork market is first and foremost a commodity market, defined as a market where the products of all sellers are very similar, and price will tend to fluctuate depending on available supplies and level of interest (demand)**. While there are numerous strategies by fresh pork sellers to differentiate their products, including branding and further processing, and there are definitely a range of product attributes, **most attempts by sellers to differentiate their products have met with limited success**. For example, during the 1990s, the industry adopted on a large scale new leaner genetics, resulting in pork cuts with less fat and higher meat yield. Individual cut specifications also improved, with more trimming and other packaging enhancements. **Although some packers attempted to extract a premium for the improved product, over time the lean, trimmed pork has become the new "commodity" specification, with no single supplier having a large advantage over another**. **If any established seller attempted to extract a larger premium for his product, buyers would begin to shop around for other suppliers who could meet their specs at a lower cost**.[260] [emphasis added]

126. The same report goes on to emphasize that, other things equal, "sellers must rely on volume and efficiencies to achieve profit targets" because "brand premiums are not large" and cannot be sustained.[261] Indeed, the report concludes that the "main characteristic of a commodity market is that 'price trumps everything else,' particularly in the long run," because "the temptation of a lower price is ever-present in an industry with historically narrow margins."[262] Clemens' Dan Groff, after testifying why it's "very common" for Defendants to buy and sell pork to each other, explained that it is a "commoditized business."[263] This is consistent with Smithfield's Robert Moore's testimony that he would not be able to tell which company had made pork products by looking at them without their packaging, because "bacon is bacon."[264]

---

[258] SMITHFIELD01463924.
[259] TF-P-000082554–555.
[260] TRI0000049789–827 at 799.
[261] *Id.*
[262] *Id.*
[263] Groff Deposition, p. 38:3–13.
[264] Deposition of Robert Moore, Dec. 21, 2021, pp. 20:24–21:07.

Paul Peil (of Hormel) similarly testified that consumers would not be able to tell the difference between different packers' pork products without labeling.[265]

127. Other industry participants and customers also recognized the commodity-like nature of pork products, and Defendants communicated in those terms. For example, a Hormel document references the USDA's "World Agricultural Supply and Demand Estimates" ("WASDE") report's estimated "per capita consumption for nearly all commodities, including pork."[266] Kroger's "standard vendor agreement" with Smithfield requires 90 days advance notice of proposed price changes "excluding commodity products (e.g., perishable products . . .)."[267] Instead, pricing for pork products under the agreement was understood to fluctuate frequently, and the parties agreed to base prices on a formula based on the USDA market price.[268] The USDA market price, of course, is not specific to Smithfield, which further demonstrates both the substitutability and commodity-like nature of pork products.[269] A 2014 JBS presentation related to Sysco repeatedly refers to "commodity pork" and includes a list of such products that run from pork shoulders to cutlets and spareribs, including Sysco's own label ("Butcher's Block").[270]

b. Defendants Bought and Sold Pork Products From Each Other

128. The presence of significant volumes of inter-Defendant sales can be evidence of commodity-like products. If a firm meets its own customers' needs by turning (in part) to horizontal competitors for supplies, that is an indication that the products are highly substitutable. Documents and sales records produced in this case indicate that Defendants frequently purchased pork from each other. For example, Clemens' Vice President of Food Service and Sales, Dan Groff testified that "it's very common for packers to sell fresh pork between each other. We have things that we can't sell that somebody else needs and vice-versa. It's all about

[265] Deposition of Paul Peil, Dec. 9, 2021, pp. 181:3–182:15.

[266] HFC-PORKAT0000064495.

[267] SMITHFIELD04516494 at 497.

[268] SMITHFIELD04516433. *See also* SMITHFIELD01463924 (which notes daily or weekly price changes).

[269] As additional evidence, the USDA does not provide quality grades for pork as the "meat is generally more uniform and tender" compared with other meats that the USDA grades. Packaged Facts, "The Fresh Meat Market in the U.S.: Beef, Chicken, Pork, Turkey and Lamb in Retail and Foodservice," Dec. 2008, p. 57 (TF-P-001733775–4149 at 3852).

[270] JBS-PORK-00117156. *See also* JBS-PORK-00781085–1089 (email chain with Sysco's Director of Category Management for Pork, in which they discuss the "commodity pork category").

trying to sell the whole carcass, and at times, you're –you got excess pork that you can't do anything with and somebody else needs. And it's—it's—it's very common."[271] This is consistent with procurement data produced by Smithfield, which shows that the company frequently purchased pork from other Defendants.[272] Scores of other documents indicate purchases and sales between Defendants.[273]

129. In addition to these documents, Defendants' transactional data shows that every Defendant sold millions of pounds to other Defendants throughout the Conspiracy Period.[274] These sales are often easily identified (for instance every Defendant sold to customer "Tyson Foods" and "JBS Distribution"), though they are sometimes more difficult to identify when the sales are to subsidiary companies of Defendants. For instance, every Defendant except Clemens reported sales to customer "Swift & Co.," a JBS company since July of 2007.[275]

c. Agri Stats Product Classification & Services Are Evidence of the Substitutability & Commodity-like Nature of Pork Products

130. On a basic level, that Defendants subscribed to Agri Stats is itself evidence of the commodity-like nature of pork products. One of the value propositions of Agri Stats is the ability to compare operations, costs, and other information about production.[276] Such benchmarking is only relevant or valuable if the products being compared are sufficiently comparable.

---

[271] Groff Deposition, p. 38:3–10.

[272] SMITHFIELD_SD_000119–138; Letter from Brian Robison, Gibson Dunn, to All Plaintiffs' Counsel, "Re: *In re Pork Antitrust Litig.,* Civil Action Nos. 0:18-cv-01776-JRT-HB (D. Minn.), 0:19-cv-01578-JRT-HB (D. Minn.), 0:19-cv-02723-JRT-HB (D. Minn.)," Sept. 17, 2021.

[273] *See, e.g.,* TF-P-001719899 (Tyson selling ribs to Hormel); TF-P-001791677 (JBS requesting hams to sell in Mexico); SMITHFIELD00908213 (Smithfield buying hams from JBS); JBS-PORK-01030277 (Seaboard requesting bellies from JBS); JBS-PORK-01018789 (JBS buying hams from Hormel); TF-P-001411152 (Tyson sells pork to Cargill (JBS)); SBF0321017 (Seaboard sells pork to Indiana Packers); HFC-PORKAT0000081625 (Hormel buys ribs from Indiana Packers); SMITHFIELD01240655 (Smithfield sells bellies to Hormel); SMITHFIELD01199959 (Tyson buys bellies from Smithfield); HFC-PORKAT0000033928 (Hormel asks Tyson for boneless pork butts); CLMNS-0000531090 (Clemens sells pork from its plants to Tyson); SMITHFIELD02138221 (Clemens' interest in co-packing arrangement for ham).

[274] See backup production.

[275] Associated Press, "Swift sold to Brazilian firm," *Denver Post,* July 12, 2007, https://www.denverpost.com/2007/07/12/swift-sold-to-brazilian-firm/.

[276] AGSTAT-P-0002793877; AGSTAT-P-0000000446. Agri Stats' "Mission Statement" involves providing "accurate and timely comparative data." Agri Stats, "Partnership And Services," accessed Feb. 14, 2022, https://www.agristats.com/partnership.

131. I understand that, through Agri Stats, Defendants received (or had access to) a number of reports covering many different areas of their pork operations.[277] Through these reports, Defendants were able to compare their sales volume, pricing, profitability, and other metrics at a granular level. Each subscriber uses different terminology, labels, product codes, and other identifying markers for their individual pork products. In order to make a comparison possible, after receiving data from subscribers, Agri Stats assigns each individual product an "Agri Stats Swine Product Code" that reflects its attributes within a common classification system.

132. The codes used by Agri Stats are remarkably detailed and allow for close examination and comparison of products. There are over 350 "product form" codes that describe all parts of the hog, including various parts of the carcass, cuts of shoulder, loin, belly, ham, ribs, miscellaneous parts (e.g., jowl, feet, hocks and tails), trim, skin and bones, and organs. Within each primal cut, there are separate product form codes for bone-in and boneless, skin-on and skinless products, specific trims, and certain muscles.[278] For example, there are 38 separate product form codes that describe loin cuts and products, separately identifying bone-in and boneless loin products, sirloin and tenderloin cuts, with all their multiple variations. Agri Stats uses these product form codes as part of the very detailed "Agri Stats Codes," which also capture the information on product's weight, trim, fat content, processing method, grade, packaging type, marination and flavorings used. At the most detailed level, this classification system allows Agri Stats to accurately capture individual pork products from different Defendants, and at the same time categorize multiple products into more broad category groups which are then used for Agri Stats' reporting purposes.

133. The detailed nature of Agri Stats' classification system is further evidence of the commodity-like nature and substitutability of Defendants' products. It would make no sense for Agri Stats to undertake such a detailed process of creating comparisons across all Defendants' products if the underlying products themselves were not highly comparable and substitutable. Similarly, it would make no economic sense for Defendants to contribute their own data to Agri Stats

[277] Complaint, ¶¶ 48–66; Peil Deposition, pp. 146:4–147:1; Deposition of Cory Bollum, Dec. 1, 2021, pp. 364:8–367:24; Deposition of Damon Ginther, Dec. 7, 2021, pp. 188:23–190:24.

[278] The list of Agri Stats swine product codes was produced in a letter from Agri Stats counsel. Letter from Liam Phibbs, Hogan Lovells, to Shana Scarlett, Hagens Berman Sobol Shapiro, "Re: *In Re Pork Antitrust Litigation* (Civil Action No. 0:18-cv-01776-JRT-HB)," Dec. 15, 2021 (with attachment *AGRI-STATS_AGRICODE.PDF*).

and pay Agri Stats for access to other packers' data if other packers' products were not directly comparable to their own.

d. Hogs are Commodity-Like in Nature

134. As discussed above, there is ample evidence that pork products are commodities. The hogs Defendants slaughter and process are commodity products as well, which is consistent with the interchangeability of the downstream pork products, since there are not major differences in general size, breed, or grow operations that impact the end pork product.[279] My review of hog procurement contracts produced in this case indicates that the specific breed of hog being purchased or sold is rarely mentioned. Similarly, there appears to be widespread agreement on the appropriate or ideal size of marketable hogs. As a result, a pork packer could buy a 270-pound market hog from any number of growers to make the same pork shoulder product, which is also interchangeable with another packer's pork shoulder product from a different 270-pound market hog.

135. The commodity nature of the upstream hog market also facilitates the monopsony structure of the pork product market, as discussed in **Section III. A. 1.** above.

(a) Hog Growers Supplied Market Hogs to Multiple Defendants

136. The commodity-like nature of pork is supported by the fact that hog growers—especially larger ones—supplied multiple Defendants, often simultaneously. This is because pork products are, essentially, butchered cuts of hogs. Therefore, if the same (or substantially the same) hogs are used by multiple Defendants, the resulting pork chops, loins, and other cuts will also be the same (or substantially the same). Documents and data produced in this case show that growers, including Defendants themselves, bought and sold market hogs to and from multiple packers, often simultaneously.

[279] That is not to say that genetics are not important generally, or that certain breeds aren't more common, but rather that there appears to be an understanding among hog growers of what breeds are acceptable such that it is not a limiting factor. For example, a hog contract from 2001 between Tyson (IPB at the time) and Arthur Gilt shows a form with an entry for "Genetics" which asks simply "What are the genetics of the hogs that you are currently producing and are you anticipating any changes in genetics?" TF-P-002251273–284. According to the Pork Checkoff website, Yorkshire hogs are the most common breed in the United States, followed by Duroc, Berkshire, and Hampshire hogs. Pork Checkoff, "Top Eight Major Swine Breeds," accessed Apr. 13, 2022, https://porkcheckoff.org/pork-branding/facts-statistics/major-swine-breeds/.

137. For example, Maschhoffs, a large independent hog grower, a) entered into a 10-year agreement in 2011 to supply over a million market hogs to Smithfield each year,[280] b) also in 2011, entered into an 11 year hog procurement agreement with Hormel for hog volumes reaching 1.43 million per year by 2016,[281] and c) appears to have supplied (or least negotiated supplying) Tyson, JBS, and Triumph as well.[282] Documents also show that Prestage (another large grower) had agreements with multiple Defendants, including Smithfield,[283] Seaboard,[284] Triumph,[285] and Tyson.[286] Similarly, yet another large grower, Christensen Farms (a member of Triumph), a) had agreements to produce hogs simultaneously for (at least) Seaboard, JBS, and Tyson, and b) was able to use hogs it was specifically raising for Seaboard to meet its obligations to JBS and Tyson.[287]

(b) Defendants Bought and Sold Live Hogs to Each Other

138. Certain Defendants produced data on their hog procurement activities, including who they bought hogs from and who they sold hogs to. These data demonstrate that Defendants bought hogs from, and sold hogs to, each other throughout the Conspiracy Period. Tyson, Smithfield, and Clemens, the three Defendants that produced procurement data, all bought hundreds of thousands to millions of hogs from other Defendants or Defendant-affiliated companies. Tyson, for example bought millions of hogs from Christensen Farms, the largest shareholder of Triumph;[288] Clemens bought from Murphy-Brown, a subsidiary of Smithfield;[289] and Smithfield bought from Hillshire Brands, a wholly-owned subsidiary of Tyson.[290]

---

[280] SMITHFIELD04156577.

[281] HFC-PORKAT0000047054–7071 at 7066.

[282] JBS-PORK-00250181 (term sheet); TF-P-001633705 (email discussion between Tyson and Maschhoffs in 2016); TRI0000387004 (term sheet).

[283] PFI00019191; PFI00019264; PFI00003105; SMITHFIELD03766368.

[284] PFI00001310; SBF0258716; SBF0612244.

[285] PFI00019199; TRI0000097674.

[286] PFI00019223; TF-P-001584668; TF-P-001584677; TF-P-001618946.

[287] SBF1096303–319. *See also* JBS-PORK-00229571; TF-P-001581446.

[288] Christensen Farms, "About Us," accessed Apr. 9, 2022, https://www.christensenfarms.com/about-us/. See defendant procurement data.

[289] SEC, "Subsidiaries of the Registrant," accessed Apr. 9, 2022, https://www.sec.gov/Archives/edgar/data/91388/000119312508141434/dex21.htm. See defendant procurement data.

[290] Tyson, "Hillshire Brands Former Shareholder Information," accessed Apr. 9, 2022, https://www.tysonfoods.com/hillshire-brands. See defendant procurement data.

139. In short, Defendants were buying and selling the same key input—market hogs—from each other and other shared suppliers throughout the relevant time period. This demonstrates the large degree of substitutability of market hogs, and that pork products—slaughtered and packaged versions of the same—are also highly commodity-like in nature.

140. The universe of pork products sold by Defendants includes both raw, largely-unprocessed cuts of pork and many highly-processed products, such as smoked hams and ready-to-eat bacon. While the pricing and substitutability facets of commodity-like products apply to both unprocessed and further-processed pork, they are especially true with respect to those pork products that are at issue for the DPP Class. Evidence indicates that primal and sub-primal cuts of pork are highly commodity-like in nature. Defendants and customers considered them commodities, and the actions of upstream suppliers are consistent with pork being a commodity. The commodity-like nature of both pork products, and the upstream hogs, would have facilitated the formation and maintenance of the alleged price-fixing conspiracy, including its supply constraint mechanism.

4. Barriers to Entry

141. The usual purpose of a supply restraint agreement is to generate higher profits for the participants. Those higher returns might normally draw other firms into that market that wish to capture a share of those profits. This very concept was articulated by Robert Manly during an earnings call in 2011, after Larry Pope had touted Smithfield's "double-digit margins."[291] Pope downplayed that risk, however, because he pointed out that the industry was protected for multiple years due to the time and cost associated with entry.[292] Pope's comments illustrate a key concept in antitrust analysis: cartels are more likely to be effective when there are significant barriers to prevent or at least hinder the entry of other firms into the price-fixed market. In other words, a) barriers to entry can discourage expansion or prevent new firms from coming into the marketplace, allowing the existing cartel to raise prices above competitive levels and earn above-normal levels of profits, and b) without barriers to entry, periods of high profitability brought on by a cartel will attract new entrants that will drive

[291] TF-P-000051402–418 at 412.

[292] *Id*.

prices back to competitive levels.[293] As discussed in this section, there are significant barriers to entry for pork production.

142. As mentioned above, the vertical and horizontal integration of pork production has led to larger and larger firms, such as Defendants, with widespread influence. Thus, in order to enter this market, startups have an uphill battle. To start, a packer plant must overcome regulatory hurdles surrounding food safety, environmental regulation, and animal conditions.

143. In addition, the expense of building a new packing facility is a substantial barrier to entry. For example, the National Pork Producers Council estimated the cost of a "small" plant (2,500 hogs per day, nearly a million annually) at $33.7 million.[294] Defendants' newest plants cost hundreds of millions of dollars and can process more than 4 million hogs annually.[295] The largest facility currently is a Smithfield plant in North Carolina that can process 32,000 head a day (close to 12 million hogs annually).[296] Three large, state-of-the-art plants built in the Midwest between 2017 and 2019 include an STF facility in Sioux City, Iowa ($330 million), a Clemens facility in Coldwater, Michigan ($256 million), and a Prestage Farms construction in Mason City, Iowa ($240 million).[297] The fact that it took over half a decade from Pope's

---

[293] Carlton and Perloff, p. 131. Barriers to entry can refer to the high costs and time it takes to enter the market. *Id.,* p. 76. Posner notes that "of greater practical importance are conditions that . . . increase the length of time required for new entry to take place by making the production process a complex one that requires substantial time to organize efficiently." Richard Posner, *Antitrust Law,* 2nd ed. (Chicago, IL: University of Chicago Press, 2001), p. 74.

[294] Gretchen Vander Wal, "Real Cost of Small Plant Estimated at $33.6M," *National Hog Farmer,* Feb. 15, 2001, https://www.nationalhogfarmer.com/mag/farming_real_cost_small. Indeed, other sources indicate that even a small facility that could process 2,000 hogs per year (40 per week) would cost millions of dollars. Lacey Newlin, "So you want to build a slaughter plant?" *High Plains Journal,* June 12, 2020, https://www.hpj.com/livestock/so-you-want-to-build-a-slaughter-plant/article_a033a44e-acaf-11ea-a32d-63beecbd5f05 html.

[295] Rod Swoboda, "3 large pork processing plants coming online in Midwest in next 2 years," *Farm Progress,* June 27, 2016, https://www.farmprogress.com/story-3-large-pork-processing-plants-coming-online-midwest-next-2-years-25-142635.

[296] David Barboza, "Goliath of the Hog World; Fast Rise of Smithfield Foods Makes Regulators Wary," *New York Times,* Apr 7. 2000, https://www.nytimes.com/2000/04/07/business/goliath-of-the-hog-world-fast-rise-of-smithfield-foods-makes-regulators-wary.html.

[297] Rob Swoboda, "3 large pork processing plants coming online in Midwest in next 2 years," *Farm Progress,* June 2016, https://www.farmprogress.com/story-3-large-pork-processing-plants-coming-online-midwest-next-2-years-25-142635; Food Processing Technology, "Prestage Foods' Pork Processing Plant, Mason, City, Iowa, US," *Food Processing Technology,* https://www foodprocessing-technology.com/projects/prestage-foods-pork-processing-plant-mason-city-iowa; National Hog Farmer, "Seaboard Triumph Foods recognized by Sioux City," *National Hog Farmer,* Oct. 19, 2018, https://www nationalhogfarmer.com/business/seaboard-triumph-foods-recognized-sioux-city.

"double-digit margin" comments for these facilities to begin operations demonstrates the power of barriers to entry in the pork packing market.

144. Another significant barrier to entry in the packing market is the supply of hogs. Even if a new entrant could afford to acquire or build a facility, it would need to find enough finished hogs to process. The shrinking spot market means it would be difficult to find significant volume on the public market, and that most large hog contracts are multi-year would make it difficult for a new packer to find large, steady sources of finished hogs.[298] While a packer might be able to circumvent this challenge by becoming vertically integrated itself (i.e., starting or buying its own hog farms and managing the process from start to finish), this would only increase the capital requirements and the complexity of operations, research, logistics, labor, management, and other input supplies needed to become viable.

145. The evidence discussed in this section indicates that there have been significant barriers to entry in the pork packing industry throughout the Conspiracy Period. Other things equal, such barriers would have facilitated the formation and maintenance of the alleged conspiracy.

5. Opportunities for Forming, Monitoring, and Enforcing the Alleged Conspiracy

146. In mid-2009, Larry Pope (Smithfield's CEO) explained that no single company had the ability to "fix" the industry's apparent over-production of pork. After repeated calls for cuts to production, Pope stated that his company had been making cuts, but that it couldn't do it alone and "Somebody else has got to do something."[299] Pope's comments illustrate the basic point that individual firms, without an agreement, are often incentivized to continue expanding (or at least not to cut) production. In this section, I discuss evidence that illustrates Defendants' opportunities for forming, monitoring, and enforcing the alleged conspiracy.

a. Agri Stats

147. I understand that, throughout the Conspiracy Period, Defendants participated in Agri Stats' benchmarking services. An Agri Stats presentation specifically mentions benchmarking participation from "90% of the US swine" industry.[300] The same document highlights the

[298] Wise and Trist, p. 12.
[299] TF-P000013975–994 at 990–992.
[300] AGSTAT-P-0003424595–699 at 601.

company's extensive process for data collection from participating firms, which it then uses to produce reports.[301] Through Agri Stats' various reports, Defendants were provided with extensive details and analysis about numerous aspects of their supposed competitors' operations, including live production, costs, sales, and pricing.[302] A 2010 "Introduction" presentation highlights Agri Stats' "Accuracy and Comparison" "paradigm" by emphasizing the increased "profitability of participants," providing "accurate information," and its ability to ensure an "Apples to Apples comparison."[303]

(a) Defendants Relied Upon Agri Stats to Make Business Decisions

148. Scores of documents demonstrate that Defendants frequently relied on Agri Stats reports and information to make decisions in the marketplace.

Clemens

149. Clemens' documents show a particular focus on what Clemens described as the "economic impact" to indicate instances where Defendants could profitably raise prices based on analysis of competitors' pricing—ultimately identifying "opportunities" from the analysis.[304] For example, Joshua Rennells of Clemens testified that a priority in meeting with Agri Stats in 2012 was gaining understanding about opportunities regarding loin pricing.[305] Numerous similar documents show Clemens relying on Agri Stats information to improve pricing through comparison to competition.[306] In 2017, Clemens explicitly cited Agri Stats' competitive analysis as the basis for raising prices to Sysco.[307]

Smithfield

150. According to Mark Copa, the "primary benefit" of Agri Stats was "benchmarking" because it "allows us to look for opportunities relative to the competitive set in our industry."[308] He

[301] *Id.* at 688–691.

[302] *Id.*

[303] AGSTAT-P-0000000446, p. 16. *See also* AGSTAT-P-0003424595–699 at 692.

[304] CLMNS-0000023183, pp. 33–74 and in particular pp. 37 and 73.

[305] Deposition of Joshua Rennells, Feb. 24, 2022, pp. 220:17–226:1; CLMNS-0000078000–321 at 8000–8002 (Rennells Exhibit 292). *See also* CLMNS-0000030030–30032.

[306] CLMNS-0000032665; CLMNS-0000078000; CLMNS-0000036455; CLMNS-0000519436; CLMNS-0000036566; CLMNS-0000060956.

[307] CLMNS-0000057028–7033 at 29.

[308] Deposition of Mark Copa, Jan. 27, 2022, p. 24:16–18.

confirmed that Agri Stats provided "the best opportunity to understand what is directionally driving" Smithfield's results when they were trailing their peers.[309] A Smithfield presentation related to ribs has a title page that reads "Just raise your price."[310] The report shows that Smithfield is consistently in the bottom of the pack in terms of price and mix.[311] The report shows a $2.4 million price opportunity for spare ribs and a $1 million mix opportunity for back ribs.[312] It noted that the opportunities were based on Agri Stats data from January to September 2016.[313] Smithfield's Brian Gordon also noted the importance of paying attention to Agri Stats because " . . . you begin to understand how all the little impacts within our business model add up to a huge delta to the national average."[314] Many other documents show Smithfield relying on Agri Stats information throughout the relevant time period to identify additional "opportunities" (i.e., price increases).[315] In addition, John Zabel of Smithfield emailed John Higlers of Hormel with potentially confidential competitive data.[316]

Tyson

151. Tyson's Daniel Heffernan circulated his thoughts on Agri Stats reports to other Tyson employees, including Shane Miller.[317] This email chain contained certain Tyson products and how they compared with the industry.[318] In early 2009, Heffernan again emailed Miller with the subject line "Agri Stats Thoughts" and identified pricing opportunities from the Agri Stats reports.[319] However, later in the email chain, Deb McConnell emailed Miller telling him that Bryan Snyder of Agri Stats "recognized the 'ham primal' has a major opportunity within the

[309] Copa Deposition, p. 86:17–18.

[310] SMITHFIELD01003515–530 at 515.

[311] *Id.* at 516–521 and 525–527.

[312] *Id*. at 516–518.

[313] *Id.*at 518.

[314] SMITHFIELD01046455.

[315] Copa Deposition, p. 104:16–20; SMITHFIELD00371676–677; SMITHFIELD00536985–986; SMITHFIELD00715331–332; SMITHFIELD00536957; SMITHFIELD00918546; SMITHFIELD00651440–441; SMITHFIELD01007101.

[316] HFC-PORKAT0000024106–111.

[317] TF-P-000232490.

[318] *Id*.

[319] TF-P-000091817–818.

Sales Data Miner. He promised to work together on this."[320] Numerous other documents show Tyson seeking out "opportunities" based on the information Agri Stats was providing.[321]

Hormel

152. Agri Stats apprised Hormel of "opportunities" in the marketplace as well.[322] Agri Stats prepared its pricing deck ("Red Book) that showed Hormel ranked seventh out of seven in boneless loin sales due to lower sales prices than the national average, and that all loin sales in August were unfavorable, presenting an opportunity in pricing for Hormel.[323] Other documents show Hormel using Agri Stats reports in comparison to Hormel's internal understanding of its production.[324] This particular email instructs Hormel employees to "focus particularly hard targeting the area where we have been historically undervaluing the ccs," and states that "Agristats reporting can help here. Loins and hams scream out to me."[325]

Seaboard and Triumph

153. Seaboard and Triumph also relied on Agri Stats reports and information to make business decisions. For example, an email thread from McClain Southwell (Triumph) to Duke Sand (Seaboard) discussed how Southwell analyzed the overall return from the top three companies versus Triumph and Seaboard to provide the relative breakout in percentage and $/cwt for boneless loins.[326] The email also discusses their positioning relative to the competition with respect to back ribs and how there may be an opportunity for these products.[327] Another email indicates that McClain Southwell had "developed a spreadsheet which ties almost every number in the Agri Stats report—allowing us to track companies throughout the report,: showing that Triumph had likely de-anonymized the Agri Stats report.[328] The spreadsheet was

---

[320] *Id*.

[321] TF-P-000169041 (the majority of tabs were hidden in the native file); TF-P-000097445; TF-P-000374875; TF-P-001985817; TF-P-001871227; TF-P-000374875; TF-P-001289149–150.

[322] HFC-PORKAT0000016637–638; HFC-PORKAT0000272375; HFC-PORKAT0000017294–295; HFC-PORKAT0000017293.

[323] HFC-PORKAT0000022976–977; HFC-PORKAT0000022978.

[324] HFC-PORKAT0000017883–885.

[325] *Id.*

[326] TRI0000103360.

[327] *Id*.

[328] TRI0000433907. The spreadsheets noted by Rick Hoffman of Triumph may have been similar to those noted in a later email from him that were included as attachments. TRI0000335034; TRI0000335035; TRI0000335037.

described as "enlightening" and Rick Hoffman (Triumph) said he was "really excited about the opportunity to see a complete picture for each participant and to be better able to identify opportunities in sales and operations to improve results."[329] Other documents show further use of Agri Stats information and reports to increase prices.[330] For instance, Damon Ginther of Seaboard notes that Seaboard "may finally be doing something about pricing them higher" and that it was in reaction to "actual data from Agristats."[331]

JBS

154. A presentation on the information that JBS receives from Agri Stats and how they use it stated that "Our job is to identify price opportunities without sacrificing margin," and that in turn JBS would improve its "bottom line by matching industry discovery with margin-based decision making" and with the Agri Stats participants (i.e., other Defendants) also noted.[332] According to Roger Goulding of JBS, Agri Stats is "very good at pointing out where we underperform" the competition.[333] Goulding emphasized how the information has helped "our drive on Boneless loins into Japan for example."[334] Brad Lorenger of JBS received assistance from Agri Stats to identify company SKUs that show up "LOW relative to the industry."[335] Another Agri Stats presentation for JBS identifies pricing opportunities for certain primals.[336] Other spreadsheets and reports identified opportunities for JBS and recommendations for how to realize them in the marketplace.[337]

(b) Agri Stats Reports Facilitate Monitoring and Enforcement

155. As detailed above, much of the information provided by Agri Stats was meant to improve decision-making through benchmarking (i.e., comparison to competitors' behavior). Such

[329] TRI0000433907.

[330] *See, e.g.,* SBF0350830; SBF0059854; SBF0459029; SBF0062030; SBF0208411; SBF0312981; SBF0342160; SBF0350406; SBF0342619 (containing actions items in response to SBF0342160 and attached Agri Stats report).

[331] SBF0312981–983 at 981.

[332] JBS-PORK-00673115, pp. 1, 3, and 5; JBS-PORK-00673114.

[333] JBS-PORK-01774969.

[334] *Id*.

[335] JBS-PORK-00035611–612.

[336] JBS-PORK-00746397–459 at 451–456.

[337] *See, e.g.,* JBS-PORK-01089651–652; JBS-PORK-00644151–152 (and attachments JBS-PORK-00644153 and JBS-PORK-00644214); JBS-PORK-00637633; JBS-PORK-00787974–985; JBS-PORK-00010573.

information would be highly valuable in a cartel context. On a basic level, it allows for a company to make production and pricing decisions with insight into the conduct of their competitors. For example, if a firm has visibility into another competitor's sow herd and retention practices, that allows for improved forecasts about the number of piglets and ultimately the amount of pork that will be produced over the coming farrowing cycle. The same reasoning applies to pricing information. Importantly, such reports provide a mechanism for monitoring and enforcing an agreement.

156. While Agri Stats reports were meant to be anonymous, reports include a list of the companies whose data are included in any particular analysis. For example, a "Swine Processing Analysis" for Clemens from 2014 shows that the "Total Plant Costs" section (along with other sections) participants included JBS (and Cargill), Seaboard, Clemens (Hatfield), Indiana Packers, Smithfield (including Farmland Foods), Triumph, and Tyson.[338] Similarly, a report from 2015–2016 that includes export sales lists 7 participants, 6 of which are Defendants or co-conspirator Indiana Packers.[339] Documents indicate that Defendants paid attention to such details, and made inquiries when they noticed a competitor was "missing" from a given report.[340]

157. Plaintiffs have further alleged that Defendants were able to de-anonymize the data, and therefore had visibility into the details of individual competitors' production, operations, and financial performance.[341] Agri Stats live and processing reports, if de-anonymized, would allow Defendants to directly evaluate whether cuts to production or growth had taken place. Sales reports which give detailed pricing information not only allow for closer monitoring of pricing in the marketplace, but they also have the potential to decrease the competitiveness of bids for customers' business.

---

[338] CLMNS-0000169100–323 at 103, 121, 145, 175, 193, and 219.

[339] AGSTAT-P-0002816810–7002 at 6813. JBS is listed twice for different divisions, which means 8 participants are listed.

[340] *See, e.g.*, SMITHFIELD00745502–503; SMITHFIELD00752421; TF-P-000304468–470; TF-P-000306268–271; TF-P-000306676–680; TF-P-000318789–790; TF-P-001707716–717; AGSTAT-P-0002621966–968; AGSTAT-P-0002794244–247; TF-P-002407277; JBS-PORK-01030303–304.

[341] Complaint, ¶¶ 60–64. *See, e.g.*, TF-P-000578082; TF-P-000259232; TF-P-000981896–897; TF-P-000983067; TF-P-000103885; JBS-PORK-00519042–9044; TF-P-000538548; TRI0000095314–315; TRI0000433947; CLMNS-0000670325; JBS-PORK-00734266–267; TRI0000045525–528; SBF0459030–9040; JBS-PORK-01078924; TRI0000085202; SMITHFIELD01989181; TRI0000031946–952; TF-P-000495385.

b. Trade Associations

158. A history of cooperation among firms in an industry can facilitate the formation and maintenance of a cartel agreement. Such cooperation may include channels of communication, impart familiarity among the key decision makers, and lay the foundation for key relationships. Trade or industry organizations are a common format for such cooperation. Defendants participated in several such organizations and related events, including (at least) the National Pork Producers Council, the National Pork Industry Conference, the 21st Century Pork Club, and the North American Meat Institute.

(a) National Pork Producers Council

159. The National Pork Producers Council ("NPPC") is comprised of 42 "affiliated state associations" and is the "global voice for the U.S. pork industry."[342] According to its website, the NPPC is "governed by a 15-member Board of Directors," and the organization holds an annual National Pork Industry Forum each March.[343] Several Defendant executives served on NPPC's Board of Directors during the Conspiracy Period, including Cory Bollum (Hormel), Don Butler and Chris Hodges (Smithfield), and Todd Neff (Tyson).[344] Jason Brester (Tyson) currently serves on the board.[345]

160. The NPPC has its own political action committee ("PorkPAC").[346] It has a history of lobbying against legislation that pork industry participants believe to be against their self-interest, including some legislation that would promote a competitive landscape.[347] For example, in 2007, the NPPC opposed a rule introduced by the Grain Inspection, Packers and Stockyards Administration ("GIPSA") which would eliminate the need for a plaintiff to prove "actual

[342] NPPC, "Home Page," accessed Feb. 15, 2022, https://nppc.org/.

[343] NPPC, "About Us," accessed Apr. 18, 2022, https://nppc.org/about-us/.

[344] The current NPPC Board of Directors is visible on its website, while past members of the board can be seen in NPPC Annual Reports. NPPC, "Board of Directors," accessed Apr. 18, 2022, https://nppc.org/about-us/staff/#board_of_directors; NPPC Annual Report 2007, *available at* https://nppc.org/wp-content/uploads/2016/01/CPR-2007-successes.pdf ("NPPC Annual Report 2007"), p. 2; NPPC Annual Report 2011, *available at* https://nppc.org/wp-content/uploads/2016/01/CPR-2011-successes.pdf ("NPPC Annual Report 2011"), p. 2; NPPC Annual Report 2015, *available at* https://nppc.org/wp-content/uploads/2016/01/CPR-2015-successes.pdf ("NPPC Annual Report 2015"), p. 2.; NPPC0000183010.

[345] NPPC, "Board of Directors," accessed Apr. 18, 2022, https://nppc.org/about-us/staff/#board_of_directors.

[346] NPPC, "Porkpac," accessed Apr. 18, 2022, https://nppc.org/programs/pork-pac/.

[347] NPPC Annual Report 2015, p.1; NPPC0000054737.

harm to competition" in a federal antitrust lawsuit.[348] The NPPC later claimed responsibility for defeating the GIPSA Rule in 2010.[349] The NPPC has also touted its influence in blocking other federal legislation promoting fair play and competition, including a) the establishment of an Office of Special Counsel to investigate livestock competition issues, b) the establishment of an Agriculture Competition Task Force to investigate competition issues and develop guidelines governing competition, c) a requirement that parties to a merger prove the merger would not substantially lessen competition, and d) banning the use of formula pricing for selling hogs.[350]

161. The NPPC's powerful voice appears to be useful for signaling and communicating within the industry. For example, the NPPC visits with producers and packers directly and distributes "Pork Daily Intelligence," an industry newsletter, to discuss issues such as the need for supply reductions.[351] Similarly, an NPPC World Expo report shows that its calls to action resulted in 3,824 comments in opposition to the GIPSA rule in just three months.[352] Documents show that, in addition to hosting the World Pork Expo ("the world's largest pork industry-specific trade show"), the NPPC holds events like the Pork Action Group annual golf and fishing trip which brings competitors together. [353] In short, the NPPC represents a competitive risk that could have facilitated the formation and maintenance of the alleged conspiracy because it possesses confidential and competitively sensitive information and provides (or facilitates) events that bring competitors together.

(b) 21st Century Pork Club

162. Defendants were also involved in a secretive organization called the 21st Century Pork Club ("21CPC").[354] I understand that the 21CPC was established shortly after Larry Graham

[348] NPPC, "GIPSA," accessed Mar. 18, 2022, https://nppc.org/issues/issue/gipsa/.

[349] NPPC Annual Report 2011, pp. 1–2.

[350] NPPC Annual Report 2007, pp. 4–5.

[351] NPPC0000112014; NPPC0000112015; NPPC0000153516; JBS-PORK-01264697–700 at 698.

[352] NPPC0000076623, pp. 28–32.

[353] NPPC, "All About World Pork Expo," accessed Mar. 13, 2022, www.worldpork.org/all-about-expo/. *See also* NPPC0000030457.

[354] *See, e.g.,* 21CFORUM-0000003142; CLMNS-0000030331–333; SBF0184228; SBF0184229–231; TF-P-002262972–975; TF-P-000641835; HFC-PORKAT0000047285–287; 21CFORUM-0000036095.

resigned as the CEO of the NPPC in 1997.[355] In an article called "The Value of Livestock Clubs" published by AgriMarketing in March 2011, former NPPC CEO Larry Graham explained that he wanted to "stay involved in the livestock industry" and decided to form Graham Strategic Marketing, Inc.[356] One of the company's initiatives, aimed at helping "stay in close touch with the key players," was the establishment of the 21CPC.[357] Graham explained, "I've always thought that if you put smart people, with similar interests, in a room and give them a chance to openly share information, good things will happen."[358] By 2011, 21CPC included "60 industry stake holders who meet twice a year."[359] As of 2015, 20 of the 25 U.S. Pork Powerhouses were represented in 21st Century Strategic Forums.[360] A document produced in this case indicates that the purpose of the 21CPC is "to bring key pork industry leaders together in a roundtable setting twice per year to share knowledge and ideas for the good of the industry and the good of the individual businesses that are participating. This club is NOT a policy or lobbying group."[361] The same document states that "membership is confidential" and "by-invitation" only.[362]

163. In an effort to "foster open and honest communications" at these meetings, the 21CPC had "two rules. First, nothing that was said in the meeting was to be repeated outside the group, with a name attached. Second, if someone missed two meetings in a row, without a valid reason, they were dismissed from the group."[363] An organization that not only provides opportunities for horizontal competitors to meet, but also encourages the open exchange of industry information while also imposing strict confidentiality and attendance requirements, could have facilitated the alleged conspiracy.

---

[355] The Free Library, "The value of livestock clubs," accessed Feb. 14, 2022, https://www.thefreelibrary.com/The+value+of+livestock+clubs.-a0253927538. The exact timing of the establishment is not stated, but the context suggests it was before 2000. *See also* 21CFORUM-0000005084.

[356] *Id.*

[357] *Id.*

[358] *Id.*

[359] *Id.*

[360] 21CFORUM-0000005084.

[361] 21CFORUM-0000002530.

[362] *Id.*

[363] *Id.*

(c) Additional Trade Organizations

164. I understand that Defendants have also been members or otherwise involved with other trade organizations, including the National Pork Industry Conference ("NPIC") and the North American Meat Institute ("NAMI").[364]

165. The National Pork Industry Conference is annually held in Wisconsin Dells, WI during "the 2nd week of July and attracts [up to] 900 attendees" with most representing the major pork producers in North America. [365] The event offers information sessions relating to "current swine industry topics, nutrition, health, safety [and] marketing" along with other educational and networking opportunities.[366] The conference hosts numerous guest speakers each year, with past presenters including executives from both Smithfield and Tyson.[367] Smithfield, NPPC, and Pork Checkoff are among the lead sponsors for the event.[368] NPIC was founded by Larry Graham in 1996, who I understand to have been the Executive Officer of the NPPC from 1995–1997,[369] and, as discussed above, the founder of the 21CFC.

166. NAMI was created in 2015 by combining two predecessor entities—the North American Meat Association ("NAMA") and the American Meat Institute ("AMI").[370] According to NAMI's website, the organization "represents companies that process 95 percent of beef, pork, and veal, and 70 percent of turkey products in the US and their suppliers."[371] NAMI's tagline on

[364] Complaint, ¶¶ 104–118.

[365] NPIC "About," accessed Apr. 9, 2022, https://porkconference.com/.

[366] *Id.*

[367] Jim Long, "Jim Long Pork Commentary: National Pork Industry Conference (NPIC)," The Pig Site, July 17, 2019, https://www.thepigsite.com/news/2019/07/jim-long-pork-commentary-national-pork-industry-conference-npic; Lucy Towers, "Pork Commentary: National Pork Industry Conference," The Pig Site, July 22, 2015, https://www.thepigsite.com/news/2015/07/pork-commentary-national-pork-industry-conference-1.

[368] NPIC "Sponsors," accessed Apr. 9, 2022, https://porkconference.com/.

[369] NPIC "About," accessed Apr. 9, 2022, https://porkconference.com/; SuperMarket News "Pork Council Names Tank to Top Post," Mar. 10, 1997, https://www.supermarketnews.com/archive/pork-council-names-tank-top-post; Post Bulletin "NPPC Chooses New Leader," Feb. 27, 1997, https://www.postbulletin.com/nppc-chooses-new-leader; Austin Daily Herald "Pork Producers Hear from Packers," *Austin Daily Herald,* July 17, 2000, https://www.austindailyherald.com/2000/07/pork-producers-hear-from-packers/.

[370] NAMI, "History," accessed Feb. 14, 2022, https://www.meatinstitute.org/index.php?ht=d/sp/i/232/pid/232. According to the NAMI website, the AMI was formed in Chicago in 1906 and was originally dedicated to helping member companies "acclimate to the new federal inspection" regulations. The NAMA was formed from several other predecessor companies that originated around 1942 and represented the interests of meat processors and purveyors in the western areas of the US, Mexico, and Canada (and other countries).

[371] NAMI, "About NAMI," accessed Feb. 14, 2022, https://www.meatinstitute.org/index.php?ht=d/sp/i/204/pid/204.

its website is, "One unified voice for meat and poultry companies, large and small,"[372] and its directory includes all packer Defendants (and co-conspirator Indiana Packers).[373]

167. Like the other entities discussed above, these trade organizations provided opportunities for Defendants to meet under legitimate-appearing circumstances, during which they could engage in discussions that furthered the alleged conspiracy.

6. Public statements / earnings calls

168. In addition to numerous opportunities for in-person, direct communications between Defendants via the associations discussed above, regular public statements—often in the form of earnings calls for investors—provided additional avenues of communications between Defendants (and co-conspirator Indiana Packers). Plaintiffs have alleged that earnings calls were used by Defendants to signal intentions about production plans in furtherance of the alleged conspiracy.[374]

B. Common Empirical Evidence Demonstrates That Domestic Supply of Pork was Artificially Restricted and the Price of Pork Artificially Inflated as a Result of the Alleged Conspiracy

169. As discussed throughout this report, Defendants are alleged, in furtherance of the alleged conspiracy, to have agreed to collectively restrict the supply of pork. In this section, I discuss empirical and documentary evidence that the supply of pork made available to U.S. customers was restrained during the Conspiracy Period and that, as a consequence, prices were higher.

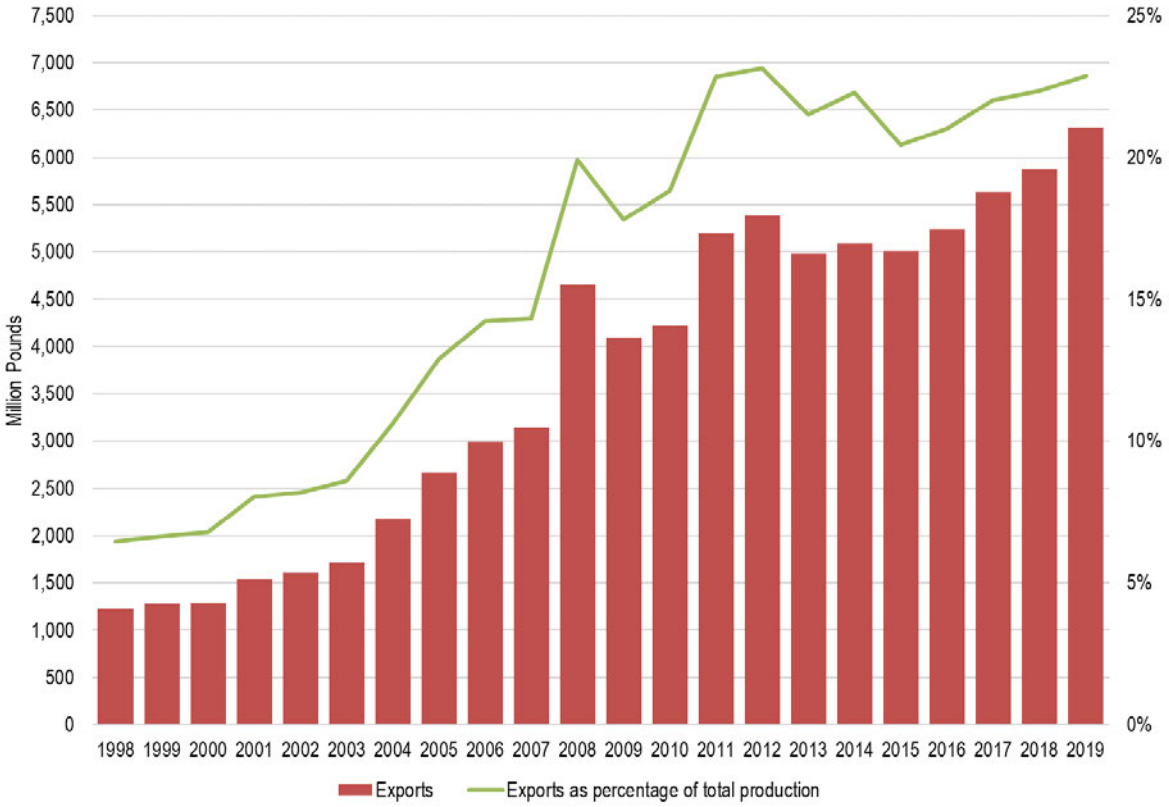
1. Exports Increased Significantly During the Relevant Timeframe, Further Restricting the Domestic Supply of Pork

170. Much of the pork produced by Defendants was ultimately sold through export markets, increasingly so during the Conspiracy Period. Other things equal, an increase in pork exports will lead to a decrease in the domestic pork supply, and thus, an increase in domestic pork prices. Defendants are alleged to have used increased exports in furtherance of the alleged conspiracy's purpose of artificially increasing domestic prices. Given this allegation, I would expect to see exports as a share of total domestic commercial production increase over the

[372] NAMI, "Home Page," accessed Feb. 14, 2022, https://www.meatinstitute.org/.
[373] NAMI, "Product Search," accessed Feb. 14, 2022, https://members.meatinstitute.org/apps/#ProductSearch.
[374] Complaint, ¶¶ 133–159.

course of the Conspiracy Period. Using USDA data, **Figure 24** below shows the volume of exports from 1998 through 2019, both in absolute terms and as a share of total domestic commercial production.

Figure 24. Export Volume & Share of Production, 1998–2019[375]



171. As shown in **Figure 24** pork exports started growing around 2004-2005, but increased even further over the course of the Conspiracy Period. Industry commentary indicates that the large spike in exports during 2008 was due to the Beijing Olympics in the summer of 2008.[376] Excluding 2008, during the decade prior to the start of the Conspiracy Period, exports averaged less than 10% of total domestic production annually.[377] From 2009 through 2019, however,

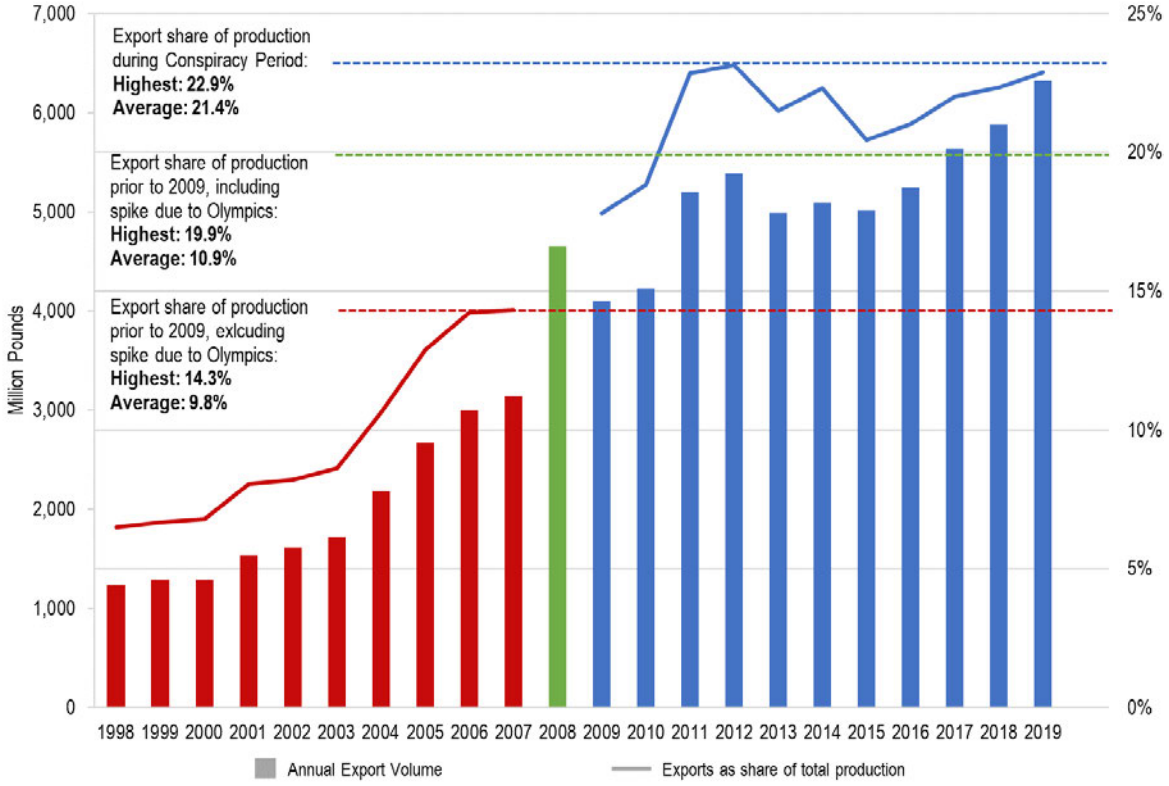
[375] *USDA Meat Supply and Disappearance.*

[376] National Hog Farmer, "Recession May Help Pork Producers Survive," *National Hog Farmer,* Dec. 23, 2008, https://www.nationalhogfarmer.com/marketing/news/recession-helping-producers-1223; Joel Haggard, "China: Hot Summer, Olympics, Slow Pork Consumption Amid Industry Expansion," US Meat Export Federation, Aug. 13, 2008, https://www.usmef.org/news-statistics/press-releases/china-hot-summer-olympics-slow-pork-consumption-amid-industry-expansion-14473/.

[377] See **Figure 25**.

exports averaged over 21%.[378] Even including the one-off 2008 Olympics-based spike, the average annual exports, both in volume and as a share of total production, were twice as high between 2009 and 2019 as they were in the 11 years prior.[379] I also note that imports over this time period decreased in terms of proportionate share.[380]

Figure 25. Pork Exports 1998–2019[381]



172. In theory, a marked increase in pork exports could be explained by higher international pork prices. If that were the case, then domestic producers could reasonably elect to export more pork because those sales would be more profitable. However, if this were the case, then you

[378] See **Figure 25**.

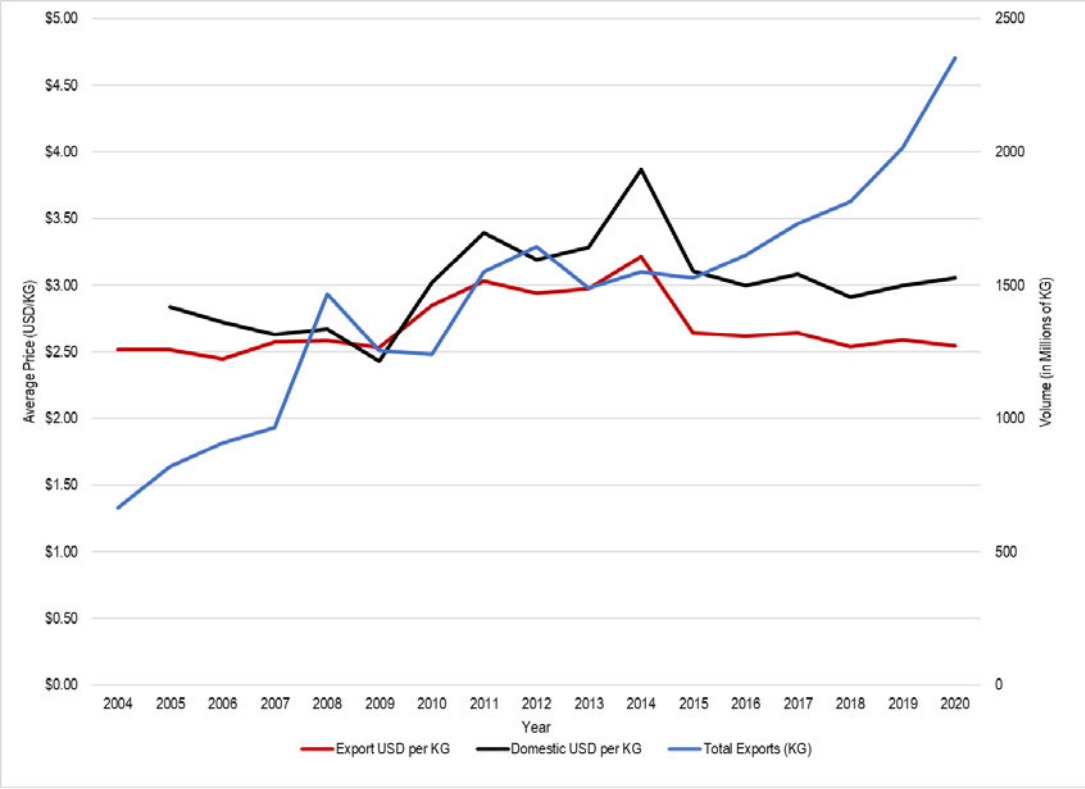
[379] Total exports averaged 2.21 billion pounds and 10.6% of total production annually during 1998–2008, and 5.19 billion pounds and 21.7% of total production during 2009–2019. *USDA Meat Supply and Disappearance*. See backup production.

[380] Total imports averaged 965 million pounds and 4.4% of total production annually during 1998–2008, and 954 million pounds and 3.8% of total production during 2009–2019. *USDA Meat Supply and Disappearance*. See backup production.

[381] *USDA Meat Supply and Disappearance.*

would expect to see prices of exports going up and exceeding the prices of products sold domestically. **Figure 26** shows the total value, in dollars per kilogram, of fresh, frozen, and chilled pork exported out of the United States between 2004 and 2021, as well as the total associated export volume. As shown, after rising between 2010–2014, (corresponding to PEDv and higher costs due to drought conditions and ethanol mandates in the United States), the prices obtained per kilogram for exported pork have largely remained at their pre-Conspiracy Period levels. Similarly, while the domestic and export prices were nearly equivalent in the years prior to the Conspiracy Period, starting in 2009 a consistent gap emerges between them, with domestic prices consistently outpacing export prices. The fact that the price per kilogram does not rise even after 2015, when exports most dramatically increase, is an indication that the true value of exports is not in their inherent profitability, but, as I explain further below, in the effect they have on the price of domestic pork.

Figure 26. U.S. ITC - Pork Exports & Values[382]



[382] USITC, USITC DataWeb, *available at* https://dataweb.usitc.gov/trade/search/TotExp/SITC

173. This evidence that Defendants were increasing exports despite declining (or flat) prices is consistent with record evidence suggesting that exported pork was often sold at lower prices than it would have received domestically, sometimes at a loss.[383] Thus, Defendants were willing to accept lower prices on exports in exchange for higher prices for domestic pork (still the majority of all pork production), which resulted from the artificially reduced supply. As explained by Dhamu Thamodaran of Smithfield:

> Anytime there is a shift in US pork supply or demand, the US hog and pork markets react. The US pork market, in a classic economic reference, exhibits an inelastic price reaction. In other words, a 1% change in supply/demand exhibits more than a 1% change in price. We estimate that a 1% change in US pork demand will result in a 3% to 5% change in price. As an example, if we increase pork exports, and thereby US pork demand, by 1% then we would expect pork and/or hog prices to increase 3% to 5%.[384]

174. In other words, by increasing exports by a small percentage, Defendants created higher prices for the remaining pork in the domestic market. For example, a Smithfield document from early 2009 indicates that if exports to Russia could be increased, it would affect ham prices "in the lower $40s" by "boost[ing] ham prices into the lower $50s."[385] An email among Tyson employees from early 2009 similarly states that "export shipments" are the "key" to "create the disappearance" necessary for profitability (i.e., higher domestic prices).[386] Another internal Tyson email thread reveals an attempt to coordinate a "humanitarian purchase" by the USDA to manufacture disappearance.[387] In 2013, Roel Andriessen (of Tyson) explained that the goal is "increase Loin, Cushion, and Picnic (through GSP) sales and, subsequently, increase overall domestic disappearance."[388] In addition, Andriessen was part of a 2015 email thread

[383] *See, e.g.,* TF-P-000521398 (discussing a "strategic sale" to Korea in order to maintain domestic price support); HFC-PORKAT0000098220 (email indicating that pork butts were sold to Mexico at a loss of $25.45 cwt); TRI0000103609 (discussing selling pork to Russia and China at a loss); TRI0000102311 (certain sales for no profit or a loss to defendant companies and international sales); TF-P-000797249 (noting that Smithfield "should try" to export as much as possible "even with loss of meat sales price by doing it.").

[384] SMITHFIELD00302315.

[385] SMITHFIELD01144316.

[386] TF-P-000518663.

[387] TF-P-002030919.

[388] TF-P-000021759.

discussing the willingness to spend large amounts of money on air freight just to get pork out of the domestic market in order to keep prices high.[389]

175. Because hogs are the primary input for pork products, there is a close relationship between hog prices and pork prices.[390] Other things being equal, an increase in hog production should lead to lower hog prices, which should in turn lead to lower pork prices. However, in 2012, Paul Peil of Hormel explained that despite a forecasted hog increase of 1.6%, the availability of export markets would actually lead to a 3% price *increase* (for domestic prices).[391] An early 2013 Smithfield document notes that a) lower-than-expected pork exports in early 2013 "pushed 136 million lbs of pork . . . back onto the domestic market," and b) improvements to export demand later in the year "will be a key driver of most pork cut prices."[392]

176. Smithfield CEO Larry Pope explained during an earnings call that the export market is like "heroin" that has been "fueling this industry in a positive way."[393] Similarly, when asked why he was so optimistic about industry margins during a 2012 J.P. Morgan Global Protein Conference, Pope said, "One word: exports."[394] In response to this comment, Thamodaran (also with Smithfield) states, "we need pork cut out to improve" and further exclaims, "Exports, Exports!!"[395] A Hormel document from mid-2012 emphasizes the link between exports and cutout prices: "The pork supply forecast combined with the fact that exports are expected to grow 2–3% leaves per capita supplies in the U.S. down at least 2%. The net impact of this reduction is a 2013 Cutout price being forecasted in the $85–$90 range; a 5–10% increase from 2012 levels."[396]

177. Later in the Conspiracy Period, when domestic hog production was increasing, the importance of pork exports grew further. Subscription records produced by Agri Stats indicate that Defendants began receiving a new report focused specifically on export sales during the latter

[389] TF-P-000665127.

[390] Thamodaran of Smithfield stated that pork prices have a "90% correlation" with live hog prices. SMITHFIELD00872455.

[391] HFC-PORKAT0000030322.

[392] SMITHFIELD00898317.

[393] HFC-PORKAT0000359723–745 at 725.

[394] SMITHFIELD00828433–435 at 434.

[395] *Id*. at 433

[396] HFC-PORKAT0000046252.

half of the Conspiracy Period.[397] Larry Pope emphasized in mid-2015 that prices for domestic pork meant, "Bottom line, we need to get it out of the country."[398] In late 2015, Kenneth Sullivan (of Smithfield) reiterated the purpose of this strategy: "The more U.S. pork that gets out of the country, the better for the values of the meat that remains in the United States."[399] Also in late 2015, when asked why Smithfield was willing to "export at a loss," Thamodaran emphasized the same point he had made several years before: "If it helps the integrated system then we need to do it. . . . Very simple: More exports translate to higher meat value."[400] A Hormel analysis from 2015 indicated that increases in production would be "offset" by the combination of "lower imports and increased exports leaving less domestic supply."[401]

178. In a 2016 email exchange, Jason Brester and Shane Miller (of Tyson) agreed that "the industry has done a better [job of] exercising restraint and not solely focusing on market share," while Brester notes the positive correlation between export volume and profit margins.[402] Brester further commented that packers have grown "net exports as a percentage of production" at a "faster rate than the slaughter has grown in the past few years. Simply it would suggest that ham disappearance" has led to higher profits for pork packers.[403]

179. This evidence further indicates that a large focus of the export market was on its ability to increase prices in the United States. In summary, there are several important points to be made about Defendants' use of export markets. First, Defendants repeatedly and increasingly relied on export markets throughout the Conspiracy Period. Second, Defendants explicitly acknowledged that the export market was being used strategically to increase prices

[397] It is not clear when the export reports became available. However, by 2016, it appears all Defendants were purchasing the export sales report. AGSTAT-P-0002802266–287 at 266 (Clemens); AGSTAT-P-0002802266–287 at 272 (Hormel); AGSTAT-P-0002802266–287 at 275 (Indiana Packers); AGSTAT-P-0002802266–287 at 276 (JBS); AGSTAT-P-0002802266–287 at 283 (Seaboard); AGSTAT-P-0002802266–287 at 284 (Smithfield); AGSTAT-P-0002802266–287 at 285 (Triumph); AGSTAT-P-0002802266–287 at 287 (Tyson). "Customer Action Plan" documents from 2013–2014 mention an "International Sales" service category that was picked up by (at least) Smithfield, JBS (and Cargill) (AGSTAT-P-0002615248–264). The same document indicates that the information had been "shown" to Tyson and that it was a "goal" for 2014 to add the service for Triumph, Seaboard, and Indiana Packers.

[398] SMITHFIELD00829448.

[399] HFC-PORKAT0000043004.

[400] SMITHFIELD00872455.

[401] HFC-PORKAT0000150825.

[402] TF-P-001381827.

[403] *Id*.

domestically. Third, according to Defendants themselves, even a relatively small reduction in the amount of pork available domestically can have a large impact on the price paid by domestic customers. As shown in this report, the amount of pork available (as opposed to what was produced) to domestic customers declined and remained lower than pre-Conspiracy Period levels until near the end of the Conspiracy Period. Absent the alleged conspiracy, this fact, combined with the fact that pork demand in the United States has increased, would be at odds with Defendants' choice to ship ever-larger quantities of pork elsewhere.

2. Direct Overcharge Regression Analysis Shows Artificially Inflated Pork Prices

180. In **Section V.** below, I explain the multiple regression methodology that I use to estimate overcharges associated with the alleged conspiracy and present the results of my regression analyses. These models estimate the artificial inflation in the prices to DPPs of pork products during the Conspiracy Period (January 2009 through June 30, 2018). Because of the widely understood relationship between the supply of pork and the price of pork, my finding that there were widespread price increases that cannot be explained by non-conspiratorial supply and demand factors during the Conspiracy Period is further evidence that as a result of the alleged conspiracy, the supply of pork was successfully and artificially restricted.

IV. ALL OR NEARLY ALL DIRECT PURCHASERS WERE IMPACTED

181. In the sections above, I concluded that the structure and characteristics of the pork industry made it conducive to the formation and maintenance of the alleged conspiracy. Another part of my assignment in this case is to determine whether the alleged conspiracy would likely have affected or impacted all (or nearly all) customers.

182. As an initial matter, the same market characteristics that facilitate the formation and success of the alleged conspiracy also tend to prevent individual customers from avoiding impact from the alleged conspiracy. Because Defendants and alleged co-conspirator Indiana Packers dominate the pork packing industry, customers cannot generally switch to non-Defendants in response to higher prices. And even if customers could switch, because of the commodity nature of pork products, market prices depend on total industry supply, such that prices charged by non-Defendants would still be artificially inflated due to the alleged conspiracy. Likewise, due to the barriers to entry, customers could not avoid impact by turning to new entrants.

183. In addition, my conclusion of impact on all or nearly all DPPs is based on a) my analysis of the market-based pricing that is typical for DPPs; b) evidence that bid-buy customers or customers on short-term fixed price contracts would also be impacted; and c) my quantitative analysis of pork prices showing that prices moved together within a category across geographic locations, Defendants, and individual DPPs.

184. In the sections below, I discuss both economic and empirical evidence that supports the conclusion that the alleged conspiracy would have affected the prices paid by all (or nearly) all DPPs.

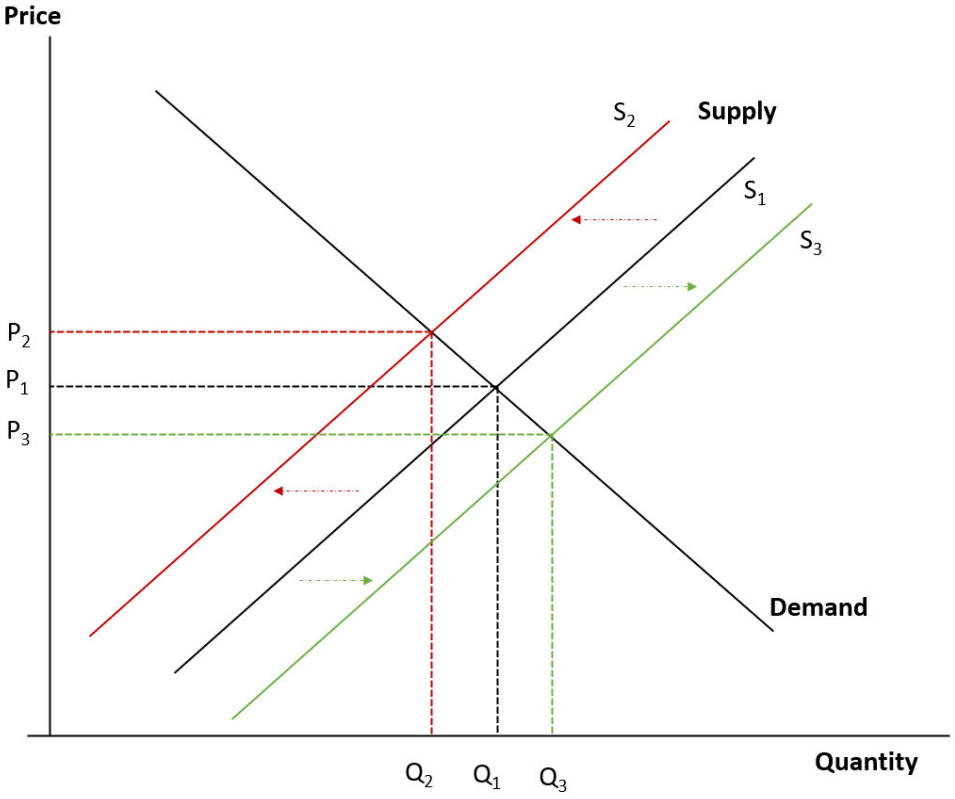
A. Pork Prices Are Determined by Supply and Demand Conditions

185. Absent central planning or an extreme degree of regulation, prices for products—including pork—are generally determined by the interaction of supply and demand. For pork products specifically, prices are determined by the amount of pork the packers are willing to supply and the amount of pork customers are willing to purchase. As explained by Meyer and Goodwin, "demand" for pork is not a single value—it is a series of price-quantity pairs that (like virtually all economic goods) are inversely related: if prices go up, quantity demanded goes down; if prices go down, quantity demanded goes up.[404] This is best illustrated through the classic downward-sloping demand curve and upward-sloping supply curve, shown below in **Figure 27** below.

186. Shifts in demand or supply will necessarily affect all price-quantity pairs. For example, other things equal, if production costs decrease, the supply curve "shifts" to the right, because the quantity firms are willing to produce is higher at all price levels. In contrast, if the supply curve shifts inward, other things equal, prices for all price-quantity pairs will be higher. A supply restriction, such as the one alleged here, amounts to an inward shift in the industry supply curve. As a matter of economics, reducing the amount of pork available in the marketplace shifts the supply curve inward, leading to higher prices at all quantity levels for the remaining pork products. This is illustrated in **Figure 27** below. Critically, an inward shift in supply curve could be caused by actual production cuts, increased exports, or a combination of such actions.

[404] Meyer and Goodwin, p. 14.

Figure 27. Illustration of Shifts in Supply Curve & Impact on Price



187. The prices DPPs paid for pork at any given point in time are determined by the interaction of supply of hogs and demand for pork—and for certain cuts of pork in particular. That is, at the wholesale level (i.e., where DPPs operate), demand interacts with "supply functions for wholesale pork cuts," such as loins, shoulders, and bellies.[405] While hogs are raised as a single "unit," not all parts of a hog are equal in size or valued equally by consumers. These differences in supply (via cut size), and demand for individual wholesale pork cuts leads to different valuations, which are then used to determine the "cutout" value of a pork carcass.[406] In other words, cutout value is the "sum of the prices of the various wholesale cuts multiplied by the percentage of the carcass they represent."[407] Thus, cutout price is essentially a weighted average price for a pork carcass, where the "weights" are a combination of pounds and downstream resale value. Changes in supply or demand will necessarily flow through to the

[405] Meyer and Goodwin, p. 16.
[406] *Id.*
[407] *Id.*

cutout value: if there is a decrease in the availability of hogs (due to decreased hog production) or pork (due to exports or a decrease in hog availability), that relative shortage will affect all cutout prices (via an inward shift of the supply curve). If demand for shoulders changes relative to demand for bellies, then the retail prices that reflect this change and the pound weighting of these cuts will lead to a different cutout price.

188. A critical question is how much changes in supply or demand affect the cutout price. According to Meyer and Goodwin, "consumer-level pork demand—and thus wholesale pork demand and hog demand—are by nature inelastic, meaning that any change in the quantity offered for sale will cause a larger price change in percentage terms in the opposite direction. So, when the supply curve [decreases] (shifts to the [left]), prices [rise] by a greater percentage than quantity [decreases] and producers' total revenues [increase]."[408] Meyer and Goodwin note that this creates a clear incentive for collusive supply restraints, necessitating the creation and enforcement of antitrust laws.[409] This assessment is consistent with numerous statements from Defendants about the importance of using export markets to "create" disappearance in the domestic market to elevate prices paid for pork sold domestically, as I discussed previously.

B. Pork Pricing Primarily Utilizes Market-Based Cut-Out Values, which is Consistent with All or Nearly All Direct Purchasers Being Impacted

189. Understanding that changes to demand or supply lead to changes in the cutout values is important, because cutout prices largely determine the prices paid by DPPs for pork in the United States. In simple terms, the wholesale prices for pork purchased today are based on yesterday's cutout values. Documents produced in this case indicate that Defendants sell pork products extensively through agreements and pricing mechanisms that are based on reference cutout values.

190. For example, Paul Peil of Hormel explained that some customers are "program customers" who agree to purchase "all of their pork specifically from [Hormel]."[410] Peil used Hy-Vee as an example of such a customer, and explained that prices are a "set cost over the USDA market," with prices changing weekly based on "the USDA previous week's weighted

[408] Meyer and Goodwin, p. 16.
[409] *Id*.
[410] Peil Deposition, p. 38:9–11.

average."[411] Peil further testified that securing or converting customers to "programs" was "the primary strategy within the fresh pork department," and identified several other such customers.[412] Peil reiterated:

> Now, again, keep in mind, all of these contracts were always based off of the USDA mandatory pork reporting. And that USDA market came out twice daily and then everyone for the most part I'm going to say 80/20 if not 90/10 used the previous week's entire weeks a USDA weekly weighted average as their basis to set the following week's prices for the following week's delivery. So the only thing that could change for their pricing that would move their pricing up or down was the market because they always paid the same overage or underage to the market.[413]

191. While there is an overall "carcass" cutout value, there are also primal-specific cutout values that serve as reference points for prices of those primals (or cuts based on those primals). In some instances, an overall weighted-average price formula may be used. For example, Seaboard's agreement with Laurel Grocery Company from 2016 covers a broad range of pork products and states that "pricing will be formulated off of a Tuesday night USDA Weighted Average Close for all products delivered to Laurel."[414] There may also be differences in the time period over which reference points are calculated (e.g., average cutout value over the prior weeks, two weeks, month, or any other agreed-upon period).[415] Pork products based on the same wholesale cut may reference the same cutout value, but include different adders to reflect differences in demand, additional butchering costs to create a sub-primal cut, or added value. For example, bacon and pork belly are both typically priced in reference to pork belly primal cutout values; the bacon pricing may also include additional adders or discounts to reflect yield and costs associated with the additional processing.[416]

---

[411] Peil Deposition, p. 38:14–23.

[412] Peil Deposition, pp. 41:25–42:5.

[413] Peil Deposition, pp. 42:25–43:12.

[414] SBF0574001–4003.

[415] For example, Ahold and Clemens negotiated pricing for "Buffet style Ham" for 2012–2014 based on a USDA cutout price "using the previous 4 weeks average." CLMNS-0000081280–281. In contrast, a 2-year Seaboard agreement with Southeastern Grocers, LLC from 2016 indicates that pricing would be based on "USDA five-day average closing prices for the appropriate source primal or sub-primal." SBF0566539–552; SBF0574001–4003 (noting that weekly pricing will be "formulated off of a Tuesday night USDA Weighted Average Close").

[416] *See, e.g.,* CLMNS-0000033028–3029 (referencing "formula priced bacon" based on "USDA 9/13 De-Rind Belly").

192. Defendants produced scores of documents illustrating this form of pricing. For example, a draft agreement from 2011 between Tyson and Fresh Meats, Inc. includes a "Formulas" exhibit which shows how prices for the products at issue are priced in reference to USDA cutout prices.[417] Another Tyson agreement for private-labeled "fresh pork primals" sold to a number of customers in 2017 shows a pricing calculation defined as "Market Price + Overage + Freight," where "Market Price" is directly tied to USDA cutout values.[418] The agreement draft specifies additional terms for the "overage" and "freight" components. Smithfield's 2017 agreement with Restaurant Services, Inc. shows that raw, thick-sliced bacon was priced in direct reference to USDA cutout values for bellies.[419] A document detailing Tyson's "long-term supply agreement" with Kraft Foods indicates that all "lean pork" and belly products used "formula pricing" tied to USDA cutout values.[420] JBS's response to Wakefern's pricing proposal request for 2018-2019 includes a long list of pork products, each of which was priced based on a "relevant USDA index."[421] Numerous other documents show similar arrangements.[422]

193. The use of reference cutout values increases the likelihood that the alleged conspiracy would have affected all (or virtually all) customers, at least in part because, as a matter of economics, cutout values continuously adjust to reflect supply and demand conditions. Thus, if supply was artificially restrained, cutout values would necessarily be higher than they otherwise would be, and any prices based on those cutout values would also be artificially elevated.

194. Buyer power is often considered an obstacle to successfully raising prices to supracompetitive levels. According to this theory, large customers, such as the foodservice distributor Sysco or mass retailer Walmart, are able to negotiate favorable pricing and therefore (potentially) avoid the impact that other customers might be subjected to. However, prices based on cutout values effectively eliminate this possibility: if Defendants decreased the supply of pork in the

[417] TF-P-000639648–655.

[418] TF-P-001744505–512.

[419] SMITHFIELD03631355–382.

[420] TF-P-002455139–142.

[421] JBS-PORK-00740841–845.

[422] Even agreements between related entities used USDA cutout prices. For example, the terms of a 2014 supply agreement between Seaboard and Daily's Premium Meats were altered in 2016 so as to reference "USDA belly primal" values instead of "average third party sales prices." *See, e.g.,* TRI0000108888–891.

marketplace, that would lead to increased cutout values, and increased prices for all or nearly all customers, despite the size and importance of a given customer. I also note that the regression analysis I used is based on a benchmark model, and such buyer power would exist in the benchmark period as well.[423]

C. Customers Buying Via Other Mechanisms, Including Bid-Buy or Short-Term Fixed Contracts, Would Also Be Impacted

195. Despite the widespread use of contracts and pricing based on the cutout value benchmark, there are some sales conducted through other types of contracting mechanisms, such as "bid-buy" purchases and fixed-price arrangements. As explained in this section, DPPs that purchased pork products via bid-buy or fixed pricing would also be impacted by the alleged conspiracy.

196. Paul Peil of Hormel explained in his deposition that some customers do not participate in "programs" like those discussed above. Peil testified that "bid-buy" customers would "pick up the phone [every day] and say, "I need two loads of this, three loads of that. What's your price today?' And they would call every packer in the industry and negotiate to the lowest price."[424] When asked how prices for bid-buy customers were determined, Peil again emphasized the role of the USDA's cutout values:

> Well, in the world of commodities, as you would expect, and in the world of mandatory pork price reporting, as defined by the USDA, there's two markets daily, as I indicated. And every sale that we made was reported to the USDA that then turned around and was published in the – their USDA reports that went to industry. And every packer in the industry that sold anything was under the same mandatory price reporting regulation.[425]

197. In other words, Peil not only emphasizes the commodity-like nature of pork, but also how prices charged to DPPs reflected then-current cutout values. Because cutout values are affected by supply, a reduction or restraint in the amount of pork available in the marketplace will lead to higher cutout values, and therefore higher wholesale prices charged to DPPs.

---

[423] Moreover, I am unaware of any evidence that the degree of buyer power any individual customer held relative to Defendants changed before or during the alleged conspiracy. Absent evidence of material changes in a customer's buyer power, overcharge estimates from a benchmark regression model would be unaffected by it.

[424] Peil Deposition, p. 32:1–13.

[425] Peil Deposition, pp.43:23–44:6.

198. While the evidence indicates that most pork is sold according to the variable price contracts described above, exceptions do exist. I have reviewed contracts which specify a fixed price for a certain volume of a specific pork product over a specific time period. For example, in 2009, Hormel and Winn-Dixie negotiated a Supply Agreement for a small number of ham products "for the 2009 Thanksgiving and Christmas holidays," with delivery commencing at the beginning of October and expiring on December 25, 2009.[426] Given the short time frame, the agreement identifies a fixed price (per pound) for each product.[427]

199. A contract with fixed pricing would not shield a DPP from the effects of the alleged long-term conspiracy, unless those purchases were based on prices set before the alleged conspiracy began and represented the totality of that DPP's purchases over the entire Conspiracy Period. For example, an agreement between MGM Resorts and Seaboard for a variety of pork products shows fixed pricing for a 1-year period starting in April 2018.[428] The fact that MGM Resorts' prices would (in theory) remain constant for the duration of that contract does not shield it from impact, because its prices are based on market values from the Conspiracy Period itself, and are thus affected by the alleged misconduct.

D. Analysis of Defendants' Prices Reveals a High Degree of Correlation Across Defendants, Customers, and Geographic Regions

200. Defendants' transactional data has allowed me to investigate how the prices paid by customers vary across certain economic dimensions or characteristics. Such an analysis can be helpful in shedding light on the question of whether all or virtually all customers would likely be affected by the alleged conspiracy. In this section, I show that transaction prices customers paid for pork move together across and within a) pork product types (or "cuts"), b) Defendants, and c) geographic locations. This empirical analysis is further evidence that individual DPPs could not have avoided the impact of the alleged conspiracy.

201. The Pearson correlation coefficient (or simply "correlation coefficient," often represented by the Greek letter rho ("ρ")) is a measure of the "strength or degree of linear association between

[426] HFC-PORKAT0000201650–671.
[427] *Id*. (Exhibit C).
[428] SBF1100617–635.

two variables."[429] If two variables are positively correlated, this means that they move in the same direction over a series of observations, i.e., when one variable rises, the other variable also rises. Alternatively, negatively correlated variables tend to move in opposite directions, i.e., one variable rising while the other variable falls. The correlation coefficient used to measure this observed relationship, ρ, is a standardized statistic in that it only takes on values between -1.0 and 1.0. Therefore, if two variables are perfectly positively correlated, ρ would equal 1.0; if they are perfectly negatively correlated, ρ would equal -1.0. A high correlation between two price series generally indicates that the two series are affected by the same economic forces, though it is not generally expected for two series to move in perfect lockstep fashion, even when they are affected by the same economic forces.

202. Although there are some similarities, it is important to note that correlation analysis and regression analysis are not the same. In particular, correlation analysis does not "hold all else constant" in the way that regression analysis is meant to. As a result, correlation analysis is not, on its own, conclusive "proof" of anticompetitive impact. Rather, correlation coefficients provide valuable information about the marketplace and help inform other areas of analysis, including regression modeling.

203. As noted above, I analyzed correlation in pork prices across different economically meaningful dimensions to inform my conclusions about the likelihood of widespread or common impact from the alleged conspiracy. For the price analyses that I perform in this section, I rely on price indices that I create econometrically (rather than, say, weighted average prices).[430] The advantage of these price indices is that it allows me to control for changes in products, customers, or geographic location over time. For each piece of the analysis, I include both a

[429] *See* Damodar Gujarati, *Basic Econometrics,* 4th ed. (New York, NY: McGraw Hill, 2003), p. 23.

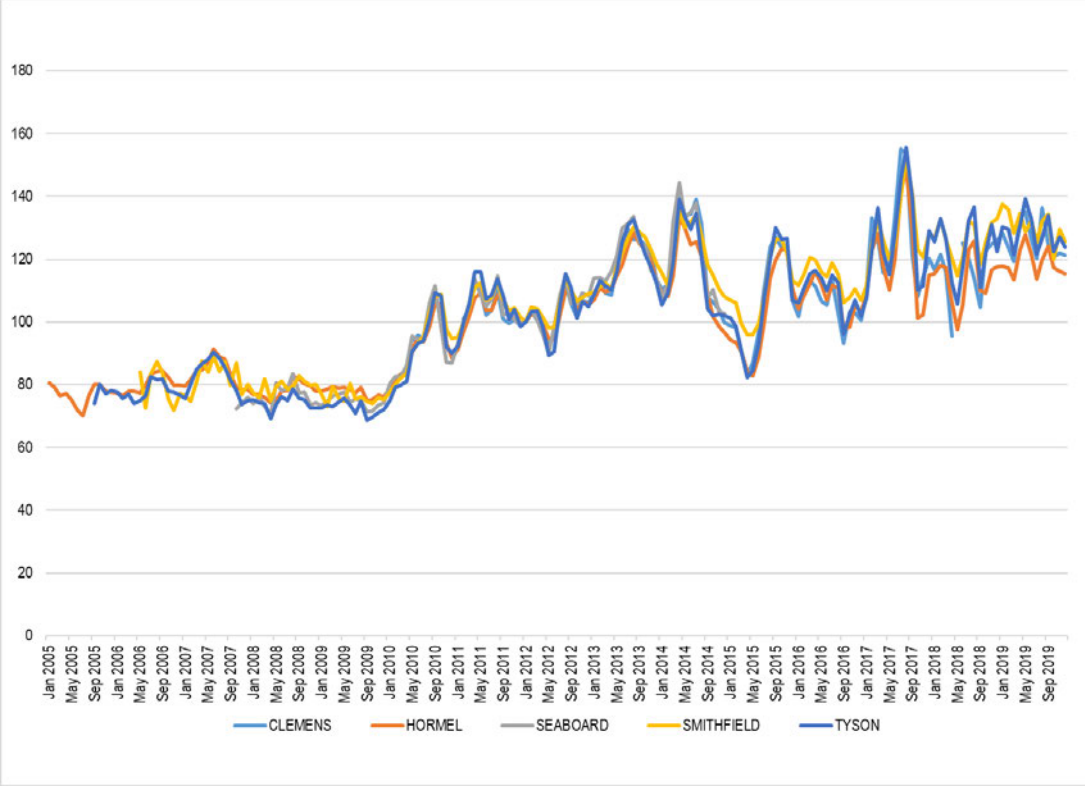
[430] I took the following steps to create the indices: For each cut, I ran a separate multiple regression analysis with the natural log of price as the dependent variable. There are two types of explanatory variables included in these regressions. First, I include a set of indicator variables that control for the combination of specific product and variable of interest associated with each monthly observation. Second, I include indicator variables for each month from January 2005 through December 2019. The coefficients on the monthly indicator variables are then converted to the monthly values of the index.

plot of the relevant prices and a table showing the results of the correlation analysis.[431] I conducted separate analyses for loins, shoulders, bacon, bellies, fresh hams, and ribs.

1. Correlation Across Defendants

204. I performed a correlation analysis of prices across different Defendants. As seen below, over time, Defendants' prices largely track one another, suggesting a reasonably high degree of price correlation across Defendants. The figures below confirm this is indeed the case, with the vast majority of calculated correlation coefficients exceeding 0.5 (*i.e.*, they are highly correlated). This is particularly the case for shoulders (all exceed 0.9), bacon (all exceed 0.9), bellies (all exceed 0.7, and most exceed 0.8), fresh ham (all exceed 0.9), and ribs (all exceed 0.7 and all but one pair exceed 0.8).

Figure 28. Defendant-Specific Price Indices for Bacon[432]
(Jan 2012=100)



[431] In these analyses, I used each Defendants' top 100 selling products (by quantity) that have sufficient data in the base period for each respective part. For example, the loin correlation table reflects the pairwise correlations between each individual Defendant's top 100 loin products. "Seaboard" includes Seaboard, Triumph, and STF.

[432] Defendants' transaction data.

Figure 29. Correlation of Bacon Price Index by Defendant[433]

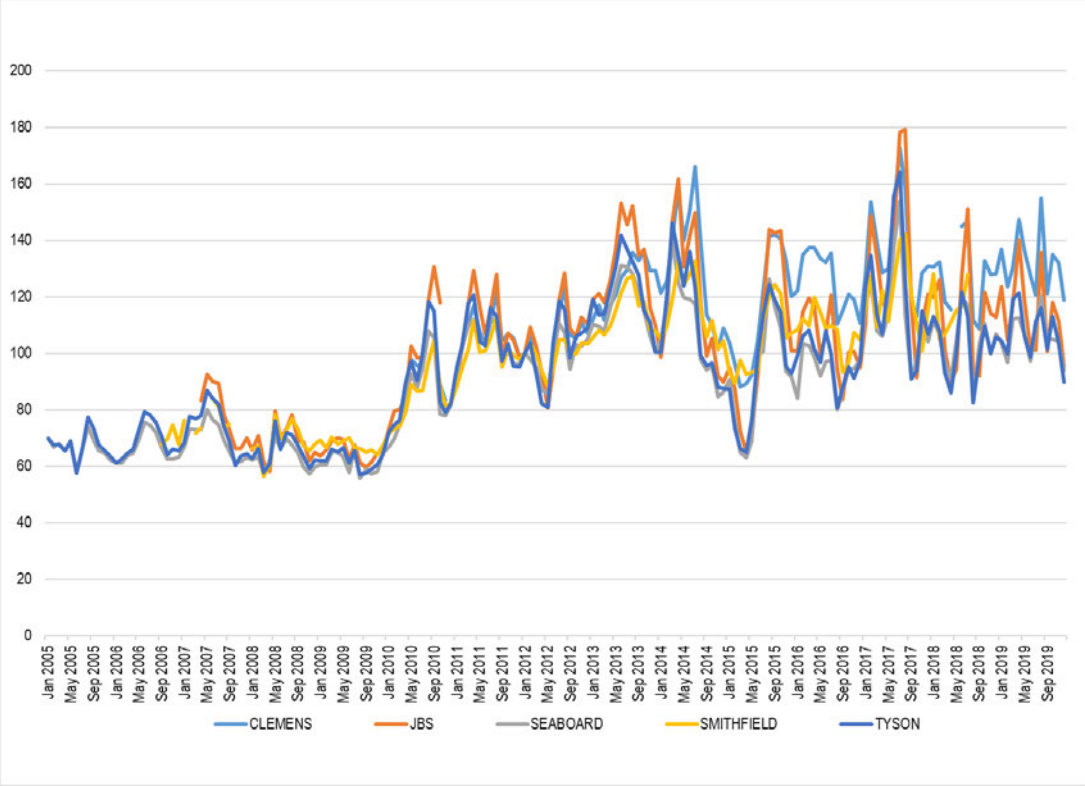
	Count	Percent of Total
Total Number of Pairwise Comparisons	10	
Greater than 0.9	10	100%
Greater than 0.8	10	100%
Greater than 0.7	10	100%
Greater than 0.6	10	100%
Greater than 0.5	10	100%

Notes:

[a] JBS has been omitted due to data availability.

[b] Restricted to pairs of defendants with more than 36 months of overlapping data and each defendant's top 100 products. Excludes defendants with fewer than 5 products in January 2012.

Figure 30. Defendant-Specific Price Indices for Bellies[434] (Jan 2012=100)



[433] Defendants' transaction data.

[434] Defendants' transaction data.

Figure 31. Correlation of Belly Price Index by Defendant[435]

	Count	Percent of Total
Total Number of Pairwise Comparisons	10	
Greater than 0.9	6	60%
Greater than 0.8	7	70%
Greater than 0.7	10	100%
Greater than 0.6	10	100%
Greater than 0.5	10	100%

Note: Restricted to pairs of defendants with more than 36 months of overlapping data and each defendant's top 100 products. Excludes defendants with fewer than 5 products in January 2012.

[435] Defendants' transaction data.

Figure 32. Defendant-Specific Price Indices for Fresh Ham[436]
(Jan 2012=100)

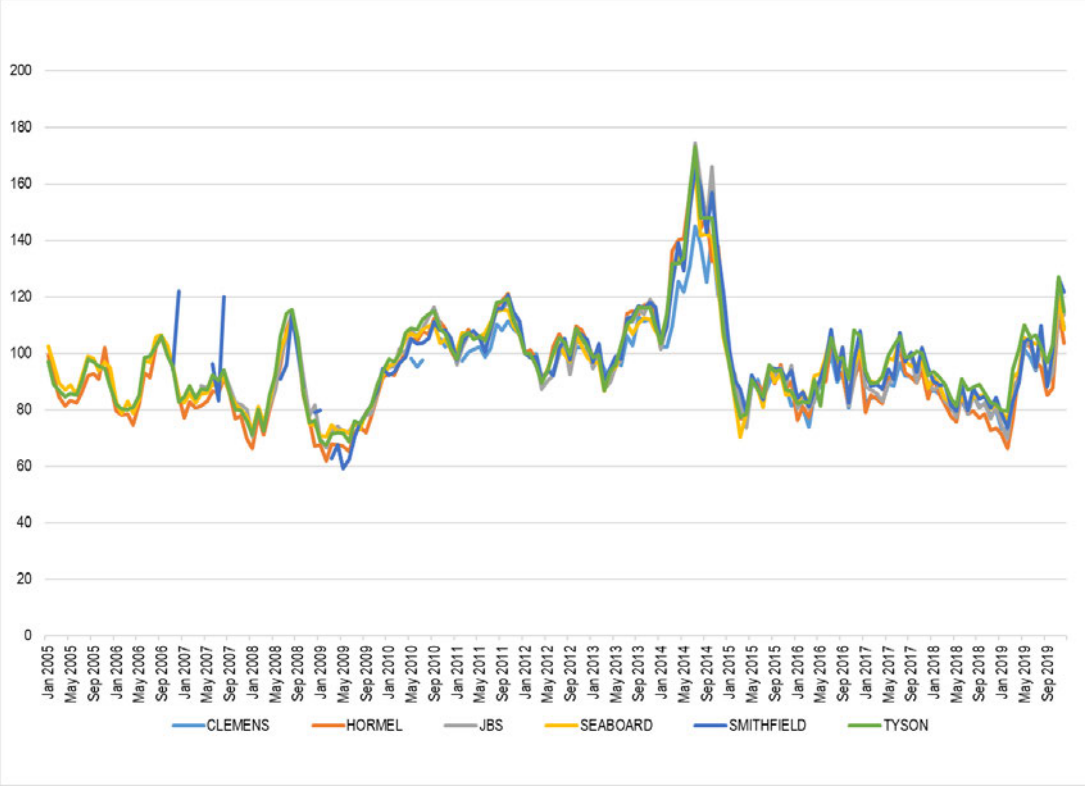


Figure 33. Correlation of Fresh Ham Price Index by Defendant[437]

	Count	Percent of Total
Total Number of Pairwise Comparisons	15	
Greater than 0.9	15	100%
Greater than 0.8	15	100%
Greater than 0.7	15	100%
Greater than 0.6	15	100%
Greater than 0.5	15	100%

Note: Restricted to pairs of defendants with more than 36 months of overlapping data and each defendant's top 100 products. Excludes defendants with fewer than 5 products in January 2012.

[436] Defendants' transaction data.
[437] Defendants' transaction data.

Figure 34. Defendant-Specific Price Indices for Loins[438]
(Jan 2012=100)

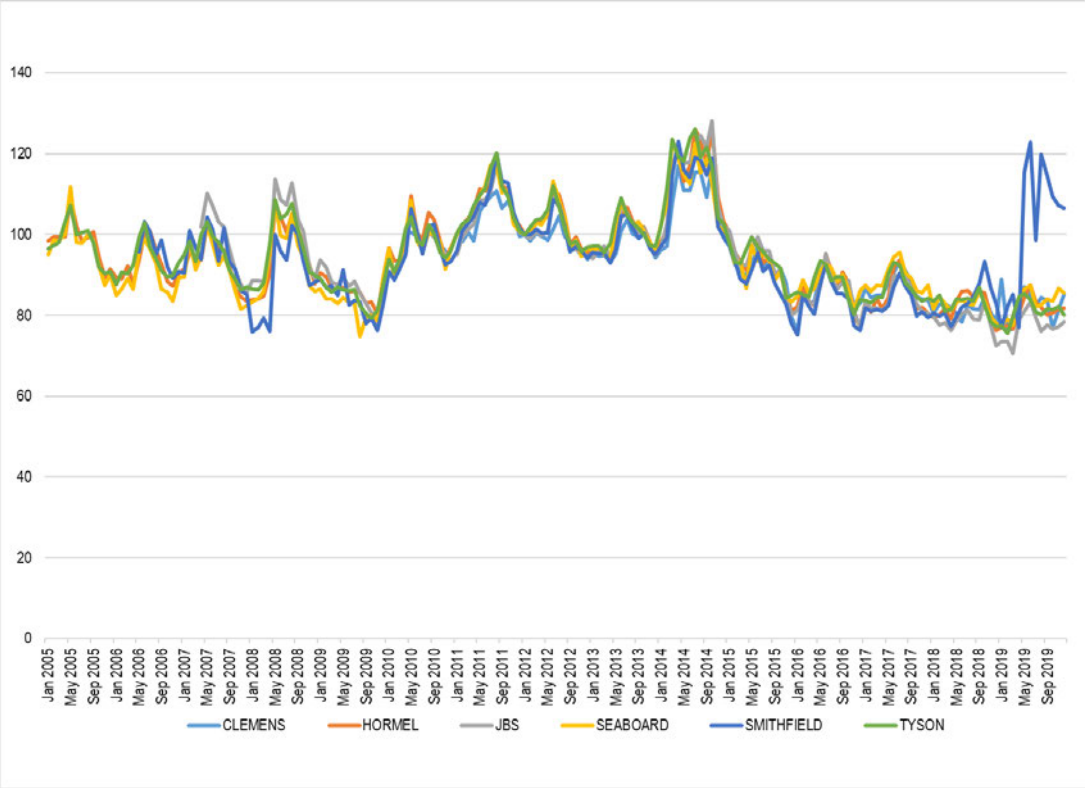


Figure 35. Correlation of Loin Price Index by Defendant[439]

	Count	Percent of Total
Total Number of Pairwise Comparisons	15	
Greater than 0.9	10	67%
Greater than 0.8	10	67%
Greater than 0.7	15	100%
Greater than 0.6	15	100%
Greater than 0.5	15	100%

Note: Restricted to pairs of defendants with more than 36 months of overlapping data and each defendant's top 100 products. Excludes defendants with fewer than 5 products in January 2012.

[438] Defendants' transaction data.
[439] Defendants' transaction data.

Figure 36. Defendant-Specific Price Indices for Rib[440]
(Jan 2012=100)

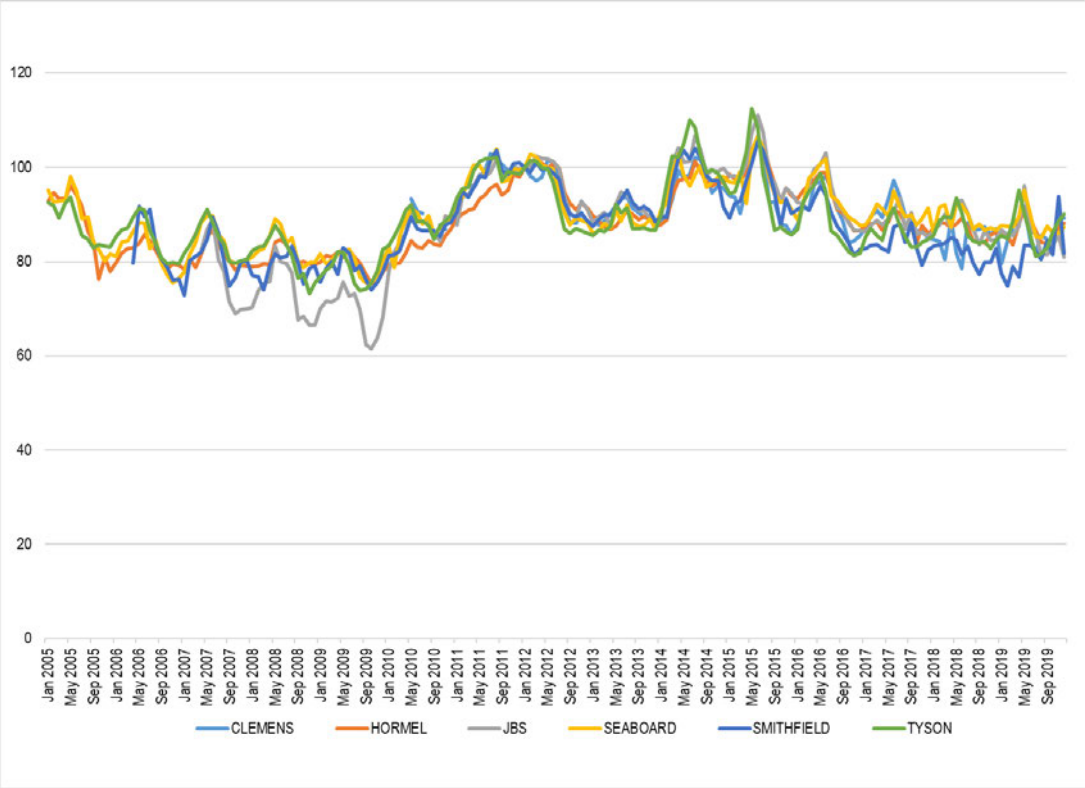


Figure 37. Correlation of Rib Price Index by Defendant[441]

	Count	Percent of Total
Total Number of Pairwise Comparisons	15	
Greater than 0.9	3	20%
Greater than 0.8	14	93%
Greater than 0.7	15	100%
Greater than 0.6	15	100%
Greater than 0.5	15	100%

Note: Restricted to pairs of defendants with more than 36 months of overlapping data and each defendant's top 100 products. Excludes defendants with fewer than 5 products in January 2012.

[440] Defendants' transaction data.
[441] Defendants' transaction data.

Figure 38. Defendant-Specific Price Indices for Shoulders[442]
(Jan 2012=100)

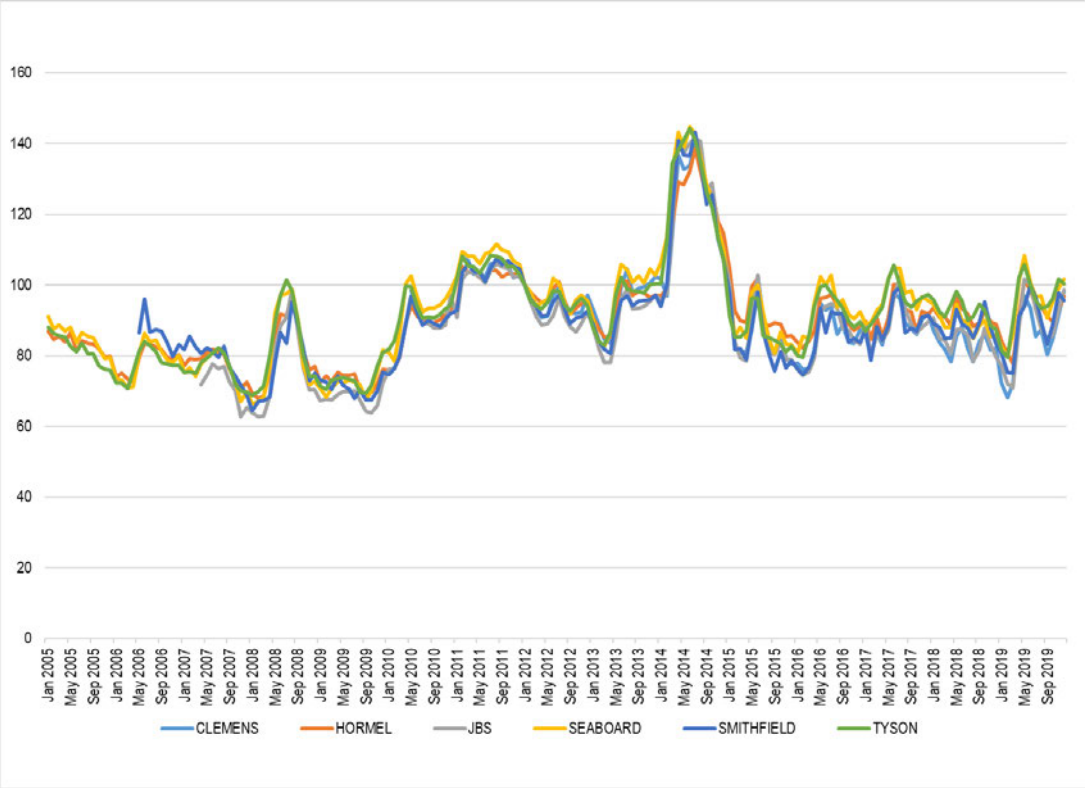


Figure 39. Correlation of Shoulder Price Index by Defendant[443]

	Count	Percent of Total
Total Number of Pairwise Comparisons	15	
Greater than 0.9	15	100%
Greater than 0.8	15	100%
Greater than 0.7	15	100%
Greater than 0.6	15	100%
Greater than 0.5	15	100%

Note: Restricted to pairs of defendants with more than 36 months of overlapping data and each defendant's top 100 products. Excludes defendants with fewer than 5 products in January 2012.

205. That Defendants' prices are highly correlated with each other is empirical evidence that the alleged conspiracy would have affected all or virtually all DPPs, because DPPs would not

[442] Defendants' transaction data.
[443] Defendants' transaction data.

have been able to avoid the impact of the alleged conspiracy by switching from one Defendant to another.

2. Correlation Across Customers

206. Next, I performed a correlation analysis of prices across different individual customers. Performing such micro-level analysis splits the dataset into increasingly small samples, and many customers do not purchase frequently or consistently enough to generate a reliable pairwise analysis. Even when a customer does purchase frequently and consistently, if purchases are highly concentrated in some way relative to other customers, it can give the appearance of differences that are not actually meaningful.[444] In order to ensure that there were enough observations to produce meaningful results, I limited this customer-level analysis to the top 50 customers, based on the total quantity.[445] However, for readability purposes, I included only the top 10 customers in the pricing graphs below. As seen in those figures, the price movements across the top 10 customers follow highly similar trends over time for each major category of pork product. The calculated correlation coefficients are consistent with this observation, with the vast majority of coefficients for the top 50 customers above 0.5 and most exceeding 0.8 for bacon, bellies, fresh ham, loin, and shoulders.

[444] A common example is Costco, because its business model tends to involve high volume sales of a single SKU, whereas other wholesalers often purchase a variety of products.

[445] As with the cross-Defendant correlations, I have also limited the analysis to the top 100 products (by sales quantity) that have sufficient data in the base period for each customer. The determination of top customers was done before ranking products; that is, the analysis does not restrict each individual customer to the same "top 100" products. Employing such a restriction risks limiting the number of pairwise comparison points in the sample.

Figure 40. Customer-Specific Price Indices for Bacon[446]
(Jan 2012=100)

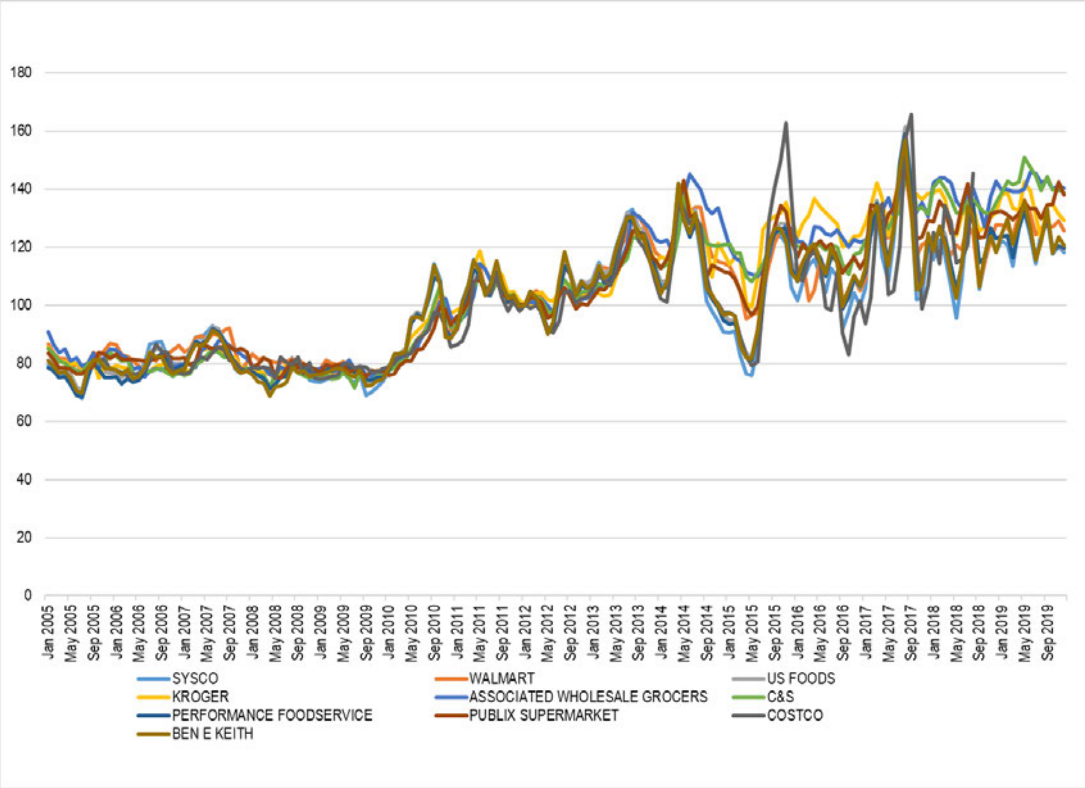


Figure 41. Correlation of Bacon Price Index by Customer, Top 50 Customers[447]

	Count	Percent of Total
Total Number of Pairwise Comparisons	1,225	
Greater than 0.9	893	73%
Greater than 0.8	1,175	96%
Greater than 0.7	1,222	100%
Greater than 0.6	1,225	100%
Greater than 0.5	1,225	100%

Notes:
[a] JBS has been omitted due to data availability.
[b] Restricted to pairs of customers with more than 36 months of overlapping data and each customer's top 100 products. Excludes customers with fewer than 5 products in January 2012.
[c] Limited to top 50 bacon customers.

[446] Defendants' transaction data.
[447] Defendants' transaction data.

Figure 42. Customer-Specific Price Indices for Bellies[448]
(Jan 2012=100)

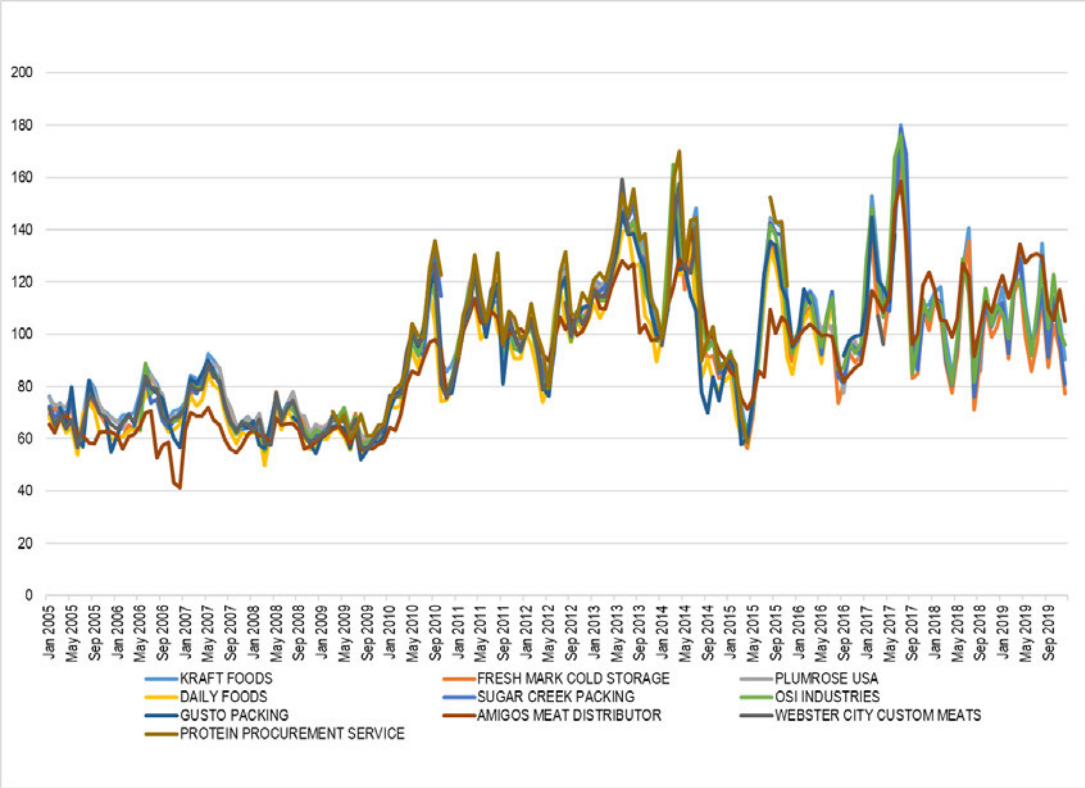


Figure 43. Correlation of Belly Price Index by Customer, Top 50 Customers[449]

	Count	Percent of Total
Total Number of Pairwise Comparisons	209	
Greater than 0.9	158	76%
Greater than 0.8	200	96%
Greater than 0.7	208	100%
Greater than 0.6	209	100%
Greater than 0.5	209	100%

Notes:
[a] Restricted to pairs of customers with more than 36 months of overlapping data and each customer's top 100 products. Excludes customers with fewer than 5 products in January 2012.
[b] Limited to top 50 belly customers.

[448] Defendants' transaction data.
[449] Defendants' transaction data.

Figure 44. Customer-Specific Price Indices for Fresh Ham[450]
(Jan 2012=100)

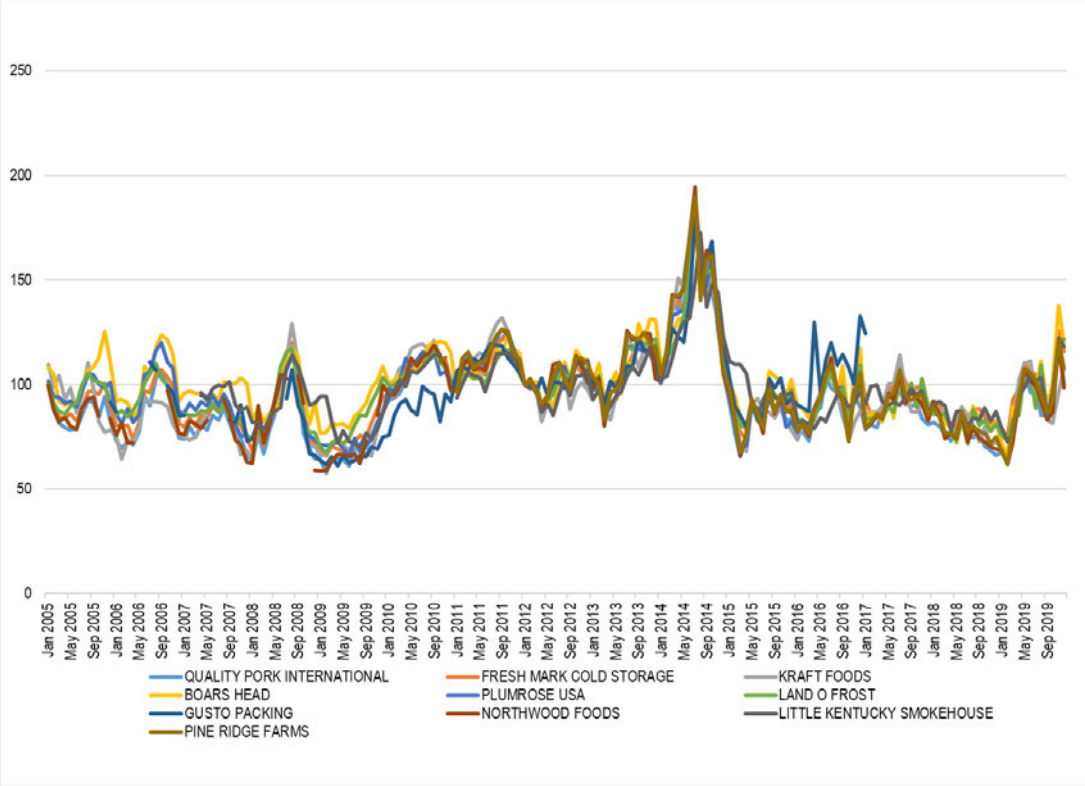


Figure 45. Correlation of Fresh Ham Price Index by Customer, Top 50 Customers[451]

	Count	Percent of Total
Total Number of Pairwise Comparisons	1,216	
Greater than 0.9	471	39%
Greater than 0.8	972	80%
Greater than 0.7	1,120	92%
Greater than 0.6	1,174	97%
Greater than 0.5	1,208	99%

Notes:
[a] Restricted to pairs of customers with more than 36 months of overlapping data and each customer's top 100 products. Excludes customers with fewer than 5 products in January 2012.
[b] Limited to top 50 fresh ham customers.

[450] Defendants' transaction data.
[451] Defendants' transaction data.

Figure 46. Customer-Specific Price Indices for Loins[452]
(Jan 2012=100)

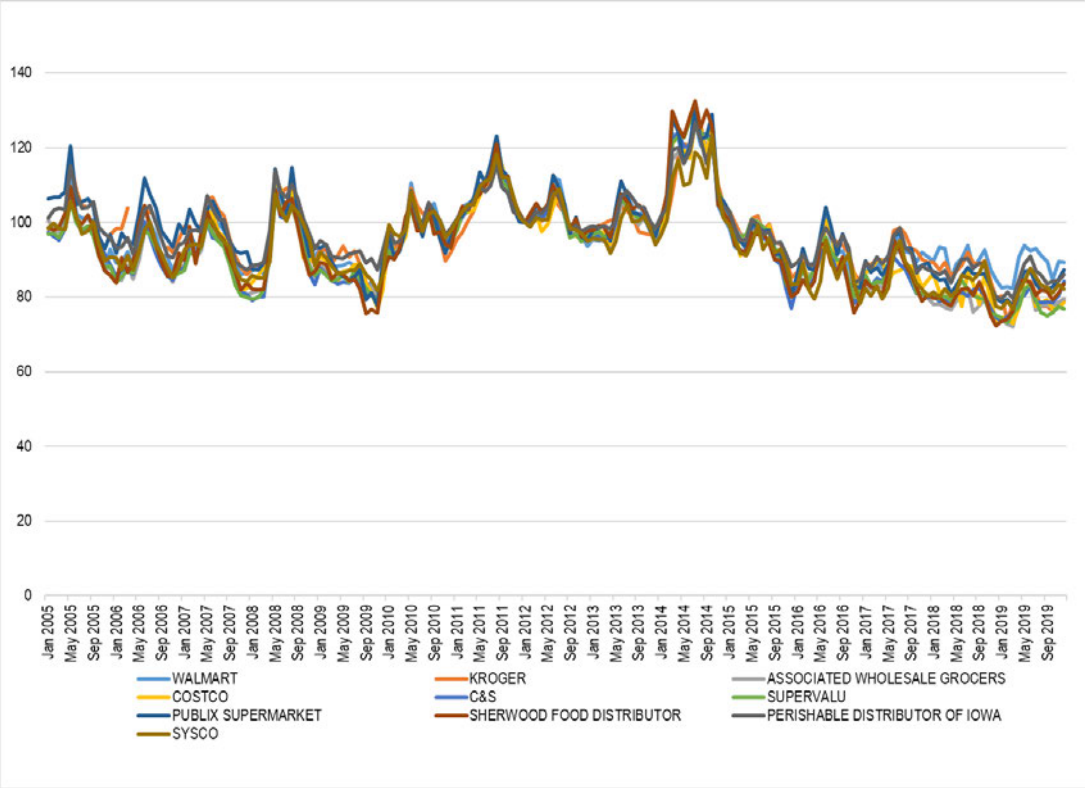


Figure 47. Correlation of Loin Price Index by Customer, Top 50 Customers[453]

	Count	Percent of Total
Total Number of Pairwise Comparisons	1,224	
Greater than 0.9	687	56%
Greater than 0.8	1,042	85%
Greater than 0.7	1,109	91%
Greater than 0.6	1,162	95%
Greater than 0.5	1,172	96%

Notes:
[a] Restricted to pairs of customers with more than 36 months of overlapping data and each customer's top 100 products. Excludes customers with fewer than 5 products in January 2012.
[b] Limited to top 50 loin customers.

[452] Defendants' transaction data.
[453] Defendants' transaction data.

Figure 48. Customer-Specific Price Indices for Ribs[454]
(Jan 2012=100)

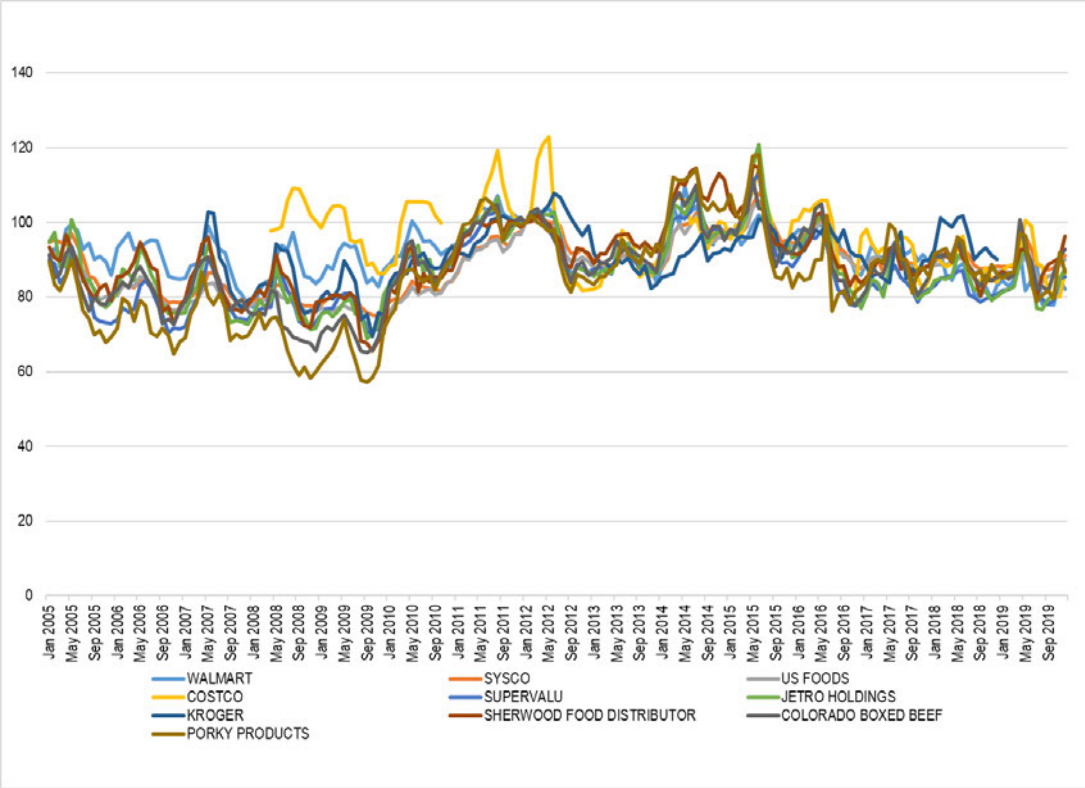


Figure 49. Correlation of Rib Price Index by Customer, Top 50 Customers[455]

	Count	Percent of Total
Total Number of Pairwise Comparisons	1,224	
Greater than 0.9	238	19%
Greater than 0.8	721	59%
Greater than 0.7	907	74%
Greater than 0.6	1,000	82%
Greater than 0.5	1,072	88%

Notes:
[a] Restricted to pairs of customers with more than 36 months of overlapping data and each customer's top 100 products. Excludes customers with fewer than 5 products in January 2012.
[b] Limited to top 50 rib customers.

[454] Defendants' transaction data.
[455] Defendants' transaction data.

Figure 50. Customer-Specific Price Indices for Shoulders[456]
(Jan 2012=100)

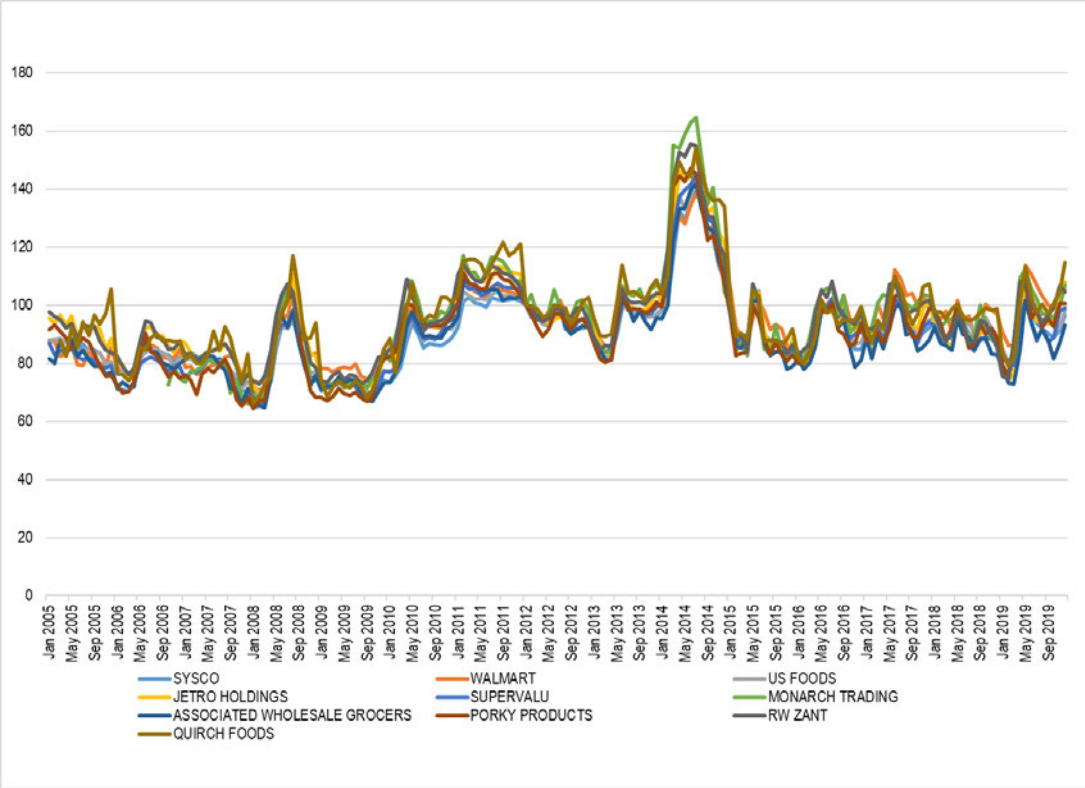


Figure 51. Correlation of Shoulder Price Index by Customer, Top 50 Customers[457]

	Count	Percent of Total
Total Number of Pairwise Comparisons	1,225	
Greater than 0.9	966	79%
Greater than 0.8	1,199	98%
Greater than 0.7	1,223	100%
Greater than 0.6	1,225	100%
Greater than 0.5	1,225	100%

Notes:
[a] Restricted to pairs of customers with more than 36 months of overlapping data and each customer's top 100 products. Excludes customers with fewer than 5 products in January 2012.
[b] Limited to top 50 shoulder customers.

[456] Defendants' transaction data.
[457] Defendants' transaction data.

207. This correlation analysis is a strong indicator that individual customers could not have avoided impact from the alleged conspiracy. Because there is a structure to pork prices across these key dimensions, this correlation analysis is evidence that a) pork products are priced in ways that are consistent with commodity products, and b) the alleged conspiracy would have affected all or virtually all customers.

3. Correlation Across Geographic Regions

208. In this section, I compared the pricing for each category of product by the state to which the pork was shipped. Other things equal, commodity-like products, such as pork, should exhibit similar prices across geographic regions. However, given the size of the United States, and because Defendants (and Defendants' packing plants) are not all located in the same place, the final prices charged would reasonably reflect differences in shipping costs.[458] There also may be geographic differences in demand for certain pork products, based on the cultural diversity of the United States, or simply from differences in seasonal effects across different regions. For example, parts of the country with warmer climates may have longer grilling seasons, which could lead to relatively higher demand in those regions for BBQ-oriented cuts of pork. I conducted this analysis for each Defendant except a) JBS, whose transaction data did not include information on the ship-to state, and b) Clemens, whose majority of transactions did not include information on the ship-to state before 2016.

209. As shown, the price index for each state follows the same pattern, with prices generally rising and falling closely together, despite differences in geography. As expected, such pricing patterns result in very high calculated correlation coefficients—once again, virtually all pairwise correlations are above 0.5 across all cuts of pork, with the vast majority above 0.8 across all cuts of pork except fresh ham. Ribs, which exhibits the lowest level of correlation, also has 80% of its pairwise correlations exceeding 0.8. Pricing correlations are particularly high for bacon products, with nearly all pairwise correlations above 0.9. This further supports

[458] *See, e.g.,* SBF0566539–552 at 543 (indicating that freight costs are adjusted and included in the final price); SMITHFIELD03631355–382 at 357.

a finding of common impact, because it indicates that the effects of the alleged conspiracy would have been nationwide, rather than limited to any specific geographical area.[459]

[459] That is, if there are meaningful differences in price across regions that are not explained by shipping costs, opportunistic customers (including those with multiple locations) could potentially earn an arbitrage by purchasing (relatively) cheap pork from one region and re-selling it in a (relatively) expensive part of the country. In practice, the perishable nature of fresh pork would likely limit customers' ability to engage in such behavior, and the closely related prices across regions shown in this section indicate that is an unlikely possibility, and thus suggests customers in all regions would be affected by the alleged conspiracy.

Figure 52. Price Index for Bacon, Top 10 States[460]
(Jan 2012=100)

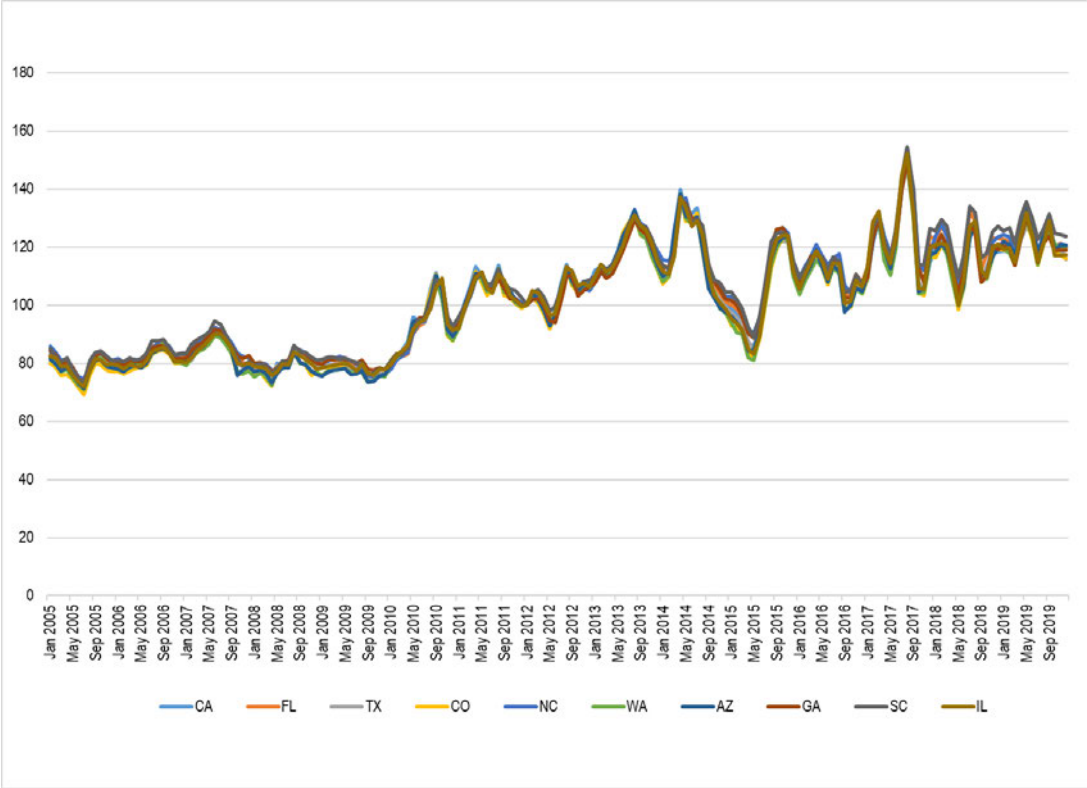


Figure 53. Correlation of Bacon Price Index by State[461]

	Count	Percent of Total
Total Number of Pairwise Comparisons	1,176	
Greater than 0.9	1,126	96%
Greater than 0.8	1,129	96%
Greater than 0.7	1,134	96%
Greater than 0.6	1,155	98%
Greater than 0.5	1,174	100%

Notes:
[a] Clemens, and JBS have been omitted due to state information availability.
[b] Restricted to pairs of states with more than 36 months of overlapping data. Excludes states with fewer than 5 product and customer combinations in January 2012.

[460] Defendants' transaction data.
[461] Defendants' transaction data.

Figure 54. Price Index for Belly, Top 10 States[462]
(Jan 2012=100)

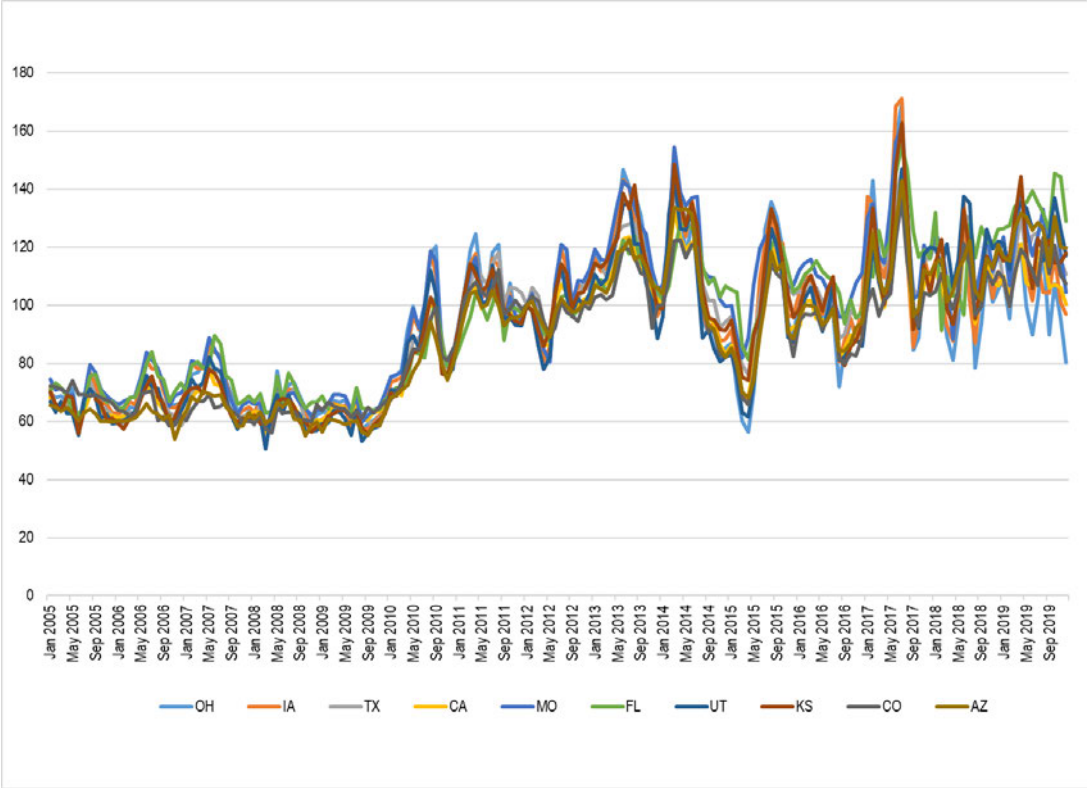


Figure 55. Correlation of Belly Price Index by State[463]

	Count	Percent of Total
Total Number of Pairwise Comparisons	210	
Greater than 0.9	149	71%
Greater than 0.8	185	88%
Greater than 0.7	208	99%
Greater than 0.6	209	100%
Greater than 0.5	210	100%

Notes:
[a] Clemens, and JBS have been omitted due to state information availability.
[b] Restricted to pairs of states with more than 36 months of overlapping data. Excludes states with fewer than 5 product and customer combinations in January 2012.

[462] Defendants' transaction data.
[463] Defendants' transaction data.

Figure 56. Price Index for Fresh Ham, Top 10 States[464]
(Jan 2012=100)

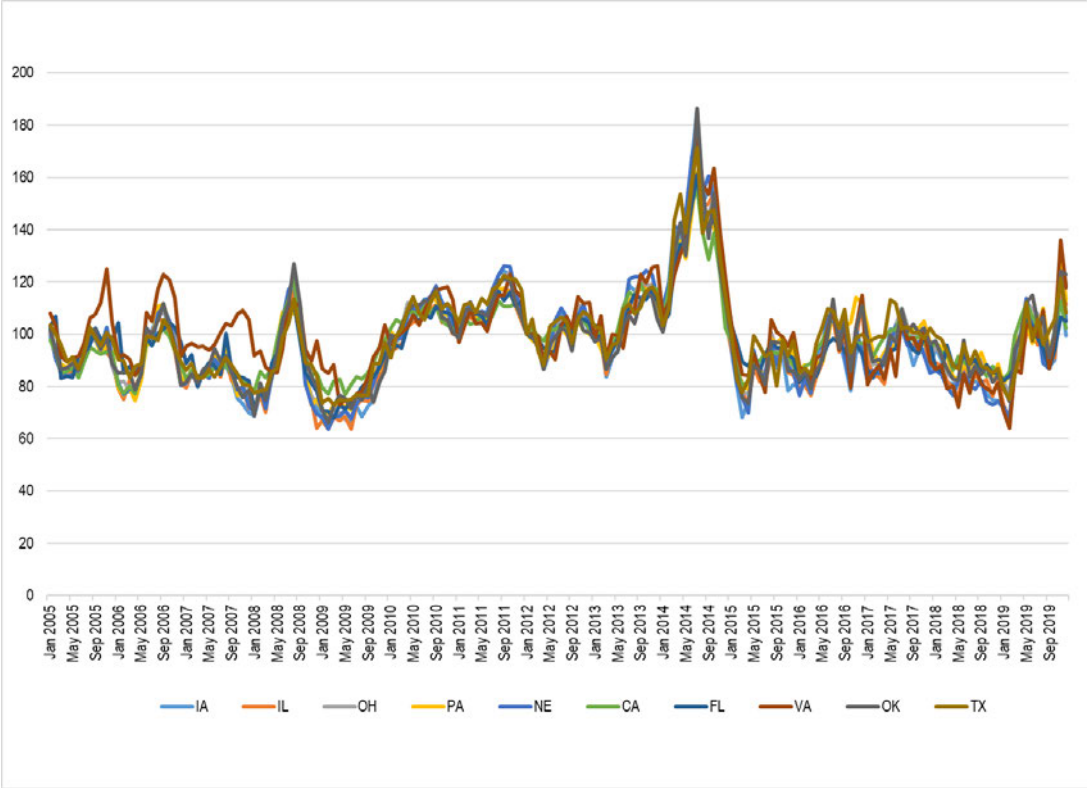


Figure 57. Correlation of Fresh Ham Price Index by State[465]

	Count	Percent of Total
Total Number of Pairwise Comparisons	496	
Greater than 0.9	187	38%
Greater than 0.8	439	89%
Greater than 0.7	483	97%
Greater than 0.6	495	100%
Greater than 0.5	495	100%

Notes:
[a] Clemens, and JBS have been omitted due to state information availability.
[b] Restricted to pairs of states with more than 36 months of overlapping data. Excludes states with fewer than 5 product and customer combinations in January 2012.

[464] Defendants' transaction data.
[465] Defendants' transaction data.

Figure 58. Price Index for Loins, Top 10 States[466]
(Jan 2012=100)

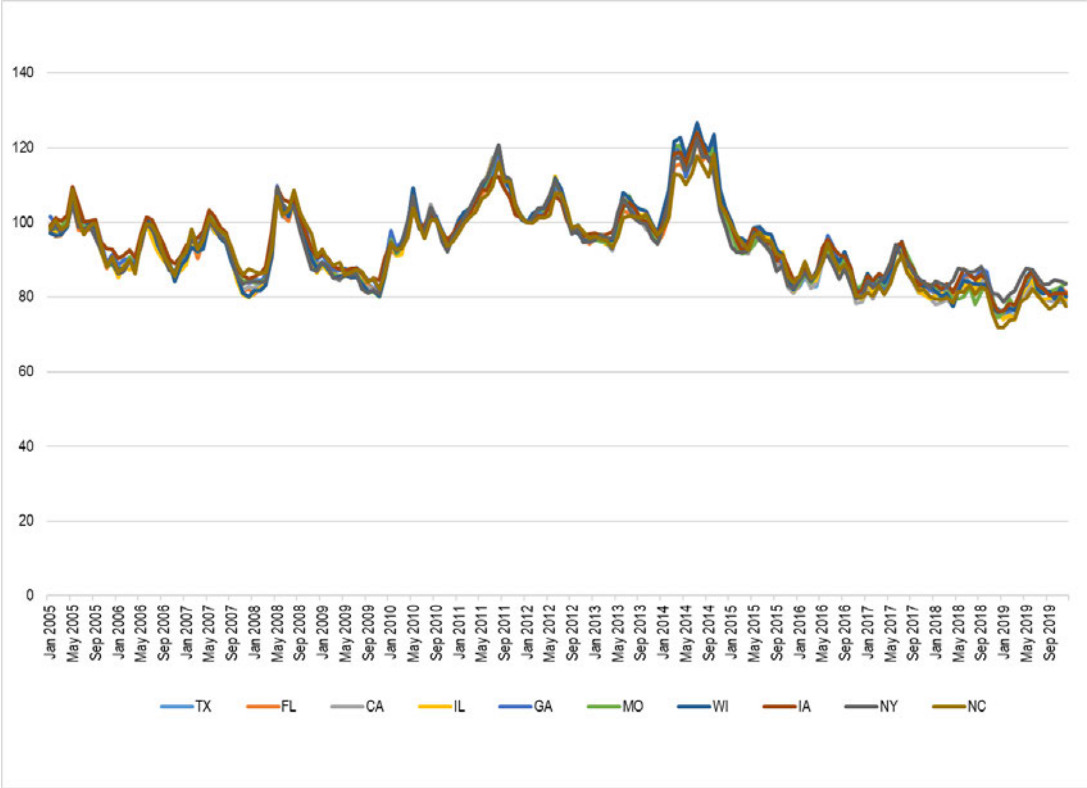


Figure 59. Correlation of Loin Price Index by State[467]

	Count	Percent of Total
Total Number of Pairwise Comparisons	1,128	
Greater than 0.9	953	84%
Greater than 0.8	1,067	95%
Greater than 0.7	1,080	96%
Greater than 0.6	1,126	100%
Greater than 0.5	1,128	100%

Notes:
[a] Clemens, and JBS have been omitted due to state information availability.
[b] Restricted to pairs of states with more than 36 months of overlapping data. Excludes states with fewer than 5 product and customer combinations in January 2012.

[466] Defendants' transaction data.
[467] Defendants' transaction data.

Figure 60. Price Index for Ribs, Top 10 States[468]
(Jan 2012=100)

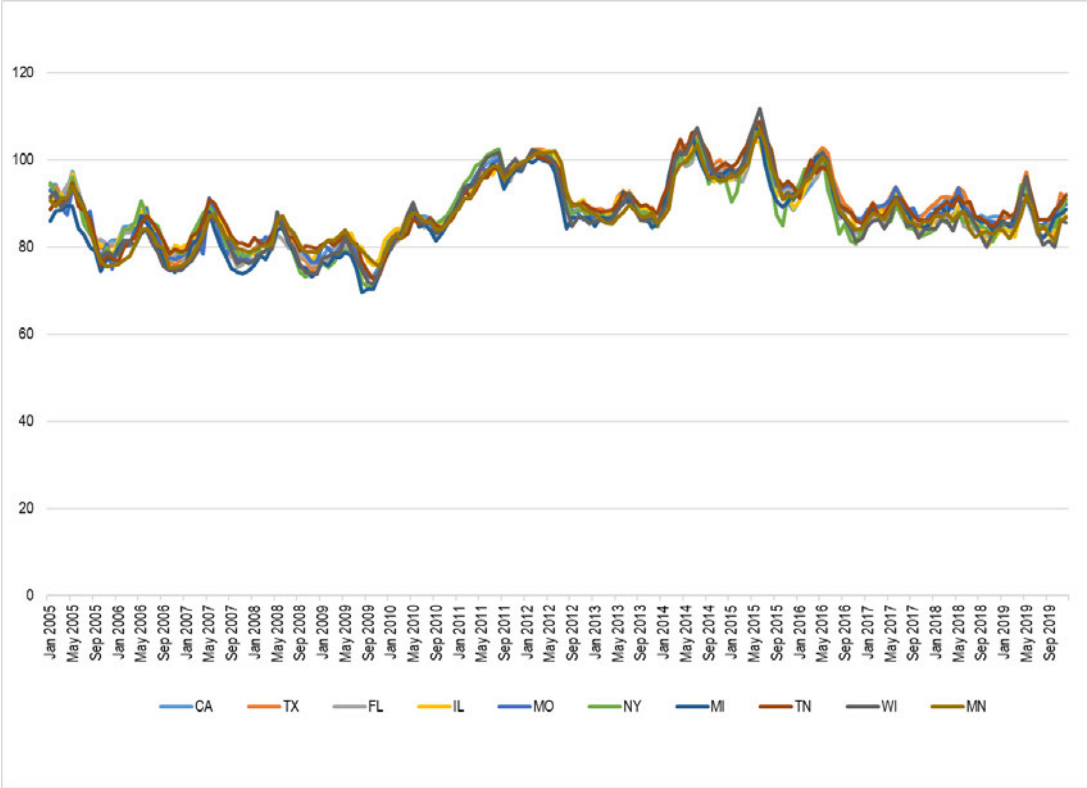


Figure 61. Correlation of Ribs Price Index by State[469]

	Count	Percent of Total
Total Number of Pairwise Comparisons	861	
Greater than 0.9	462	54%
Greater than 0.8	752	87%
Greater than 0.7	831	97%
Greater than 0.6	857	100%
Greater than 0.5	858	100%

Notes:
[a] Clemens, and JBS have been omitted due to state information availability.
[b] Restricted to pairs of states with more than 36 months of overlapping data. Excludes states with fewer than 5 product and customer combinations in January 2012.

[468] Defendants' transaction data.
[469] Defendants' transaction data.

Figure 62. Price Index for Shoulders, Top 10 States[470]
(Jan 2012=100)

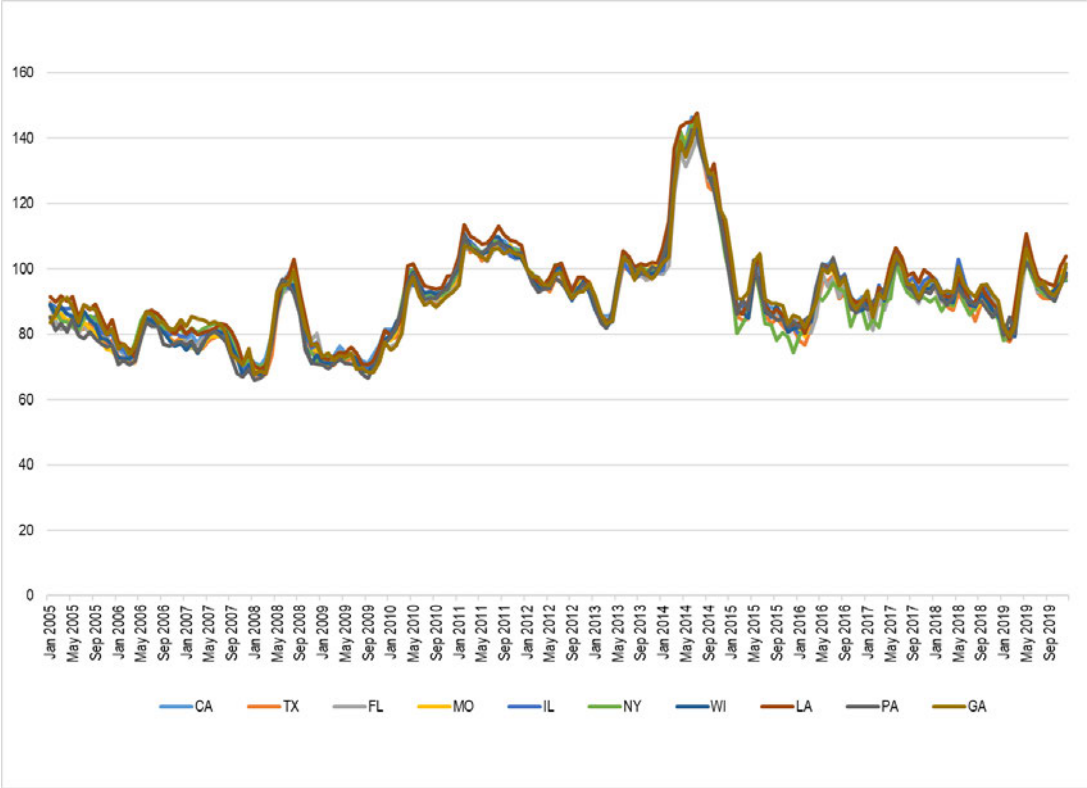


Figure 63. Correlation of Shoulder Price Index by State[471]

	Count	Percent of Total
Total Number of Pairwise Comparisons	1,081	
Greater than 0.9	859	79%
Greater than 0.8	1,025	95%
Greater than 0.7	1,051	97%
Greater than 0.6	1,081	100%
Greater than 0.5	1,081	100%

Notes:
[a] Clemens, and JBS have been omitted due to state information availability.
[b] Restricted to pairs of states with more than 36 months of overlapping data. Excludes states with fewer than 5 product and customer combinations in January 2012.

[470] Defendants' transaction data.
[471] Defendants' transaction data.

E. Alleged Conspiracy Impacted the Prices of all Relevant Products

210. The analysis presented above demonstrates that pricing for pork products is closely related across multiple dimensions relevant to the question of common impact. Because of the nature of pork production, a supply restriction on hogs should impact all pork cuts and products. Since it is not possible to grow only certain parts of hogs, each individual hog reduction results in a reduction in shoulders, hams, loins, and bellies. Therefore, the supply of any individual pork product is contingent on the overall supply and demand for all pork parts.

211. Because all pork products come from hogs, a conspiracy that affects the supply of hogs being processed would, by necessity, also affect the supply of pork. Similarly, a conspiracy that affects the quantity of pork available in the marketplace, regardless of hog supply, would also affect the prices of pork in the marketplace. For example, a restraint on packing capacity or output would affect all pork products. In the next section, I discuss estimation of overcharges for pork products, and specifically allow for the possibility that the alleged conspiracy had disparate impact on different categories of pork.

V. DIRECT OVERCHARGE ESTIMATION

212. In the previous sections, I concluded that all or nearly all DPPs were impacted by Defendants' alleged conspiracy. This conclusion is based on my findings that a) the structural characteristics of the market i) are conducive to the formation, monitoring, and enforcement of the alleged conspiracy, and ii) would have made it difficult for any DPP to avoid the impact of the alleged conspiracy; b) the widespread use of market-based formulas in setting prices; and c) the high correlation in prices across Defendants, geographic locations, and individual customers. In this section, I explain the methodology I use to estimate DPP overcharges and present the results of my analysis.

213. I measure overcharges at the direct purchaser level using multiple regression analysis, a well-established approach to measuring impact and estimating damages in horizontal conspiracy cases.[472] This approach is both feasible and reliable due to the availability of sufficient data to execute a methodology that appropriately and rigorously analyzes the question of whether

[472] *See* Jonathan Baker and Daniel Rubinfeld, "Empirical Methods in Antitrust Litigation: Review and Critique," *American Law and Economics Review* 1, no. 1 (1999): pp. 391–393; Daniel Rubinfeld, "Reference Guide on Multiple Regression," in *Reference Manual on Scientific Evidence,* 3rd ed., 2011 ("Rubinfeld"), pp. 303–357.

Defendants' alleged conspiracy a) impacted members of the proposed Class, and b) yields estimations that can be employed for the computation of Class-wide damages.

A. Background on Multiple Regression

214. Multiple regression analysis is a tool used by economists to test hypotheses about statistical relationships between observed outcomes and factors thought to explain those observed outcomes. The variable that measures the observed outcomes is referred to as the "dependent variable" (often referred to as the "left-hand side" variable, due to its location in the regression equation). The "independent variables" (also called "explanatory" or "right-hand side" variables) measure factors that explain or affect the dependent variable. More specifically, regression analysis attempts to estimate the statistical relationships between a dependent variable and a set of key explanatory variables of interest, while controlling for other factors that theoretically affect the dependent variable. The use of statistical analyses, such as regression, to explain economic relationships is referred to as "econometrics." Economists have developed numerous types of econometric models over time for use in different areas of analysis. The choice of a particular econometric model depends on the hypothesized or known economic relationships between the dependent and independent variables, and the availability and form of relevant and useable data (*e.g.*, are data continuous or discrete in nature; do variables have the same periodicity (*e.g.*, daily vs. monthly vs. annual observations)).

215. Developing an econometric model starts with the identification of an economic relationship to be studied. Appropriately rooted theories will guide the choice of variables to be used. In practice, data availability often guides the development of the model, because that allows the progression from concept to actual modeling and the formation of economic opinions.

216. In a regression model, the number that quantifies the estimated relationship between an explanatory (or independent) variable and the dependent variable is called a "coefficient estimate." Coefficients indicate both the direction and the magnitude of the relationship between each explanatory variable and the dependent variable (in the below model, price), while holding other explanatory variables constant. A particular coefficient's value estimates the extent that a change in the independent variable will cause a change in the dependent

variable.[473] The algebraic sign of the coefficient describes whether the estimated relationship is positive (*i.e.*, the dependent and independent variables move in the same direction) or negative (*i.e.*, they move in opposite directions). Coefficient estimates are also characterized by their statistical significance. A coefficient is "statistically significant" if there is a sufficiently low probability that the estimated relationship between the explanatory and dependent variables was only found by chance. The typical dividing line between a coefficient being statistically significant or not is 5%, meaning that for a statistically significant coefficient, there is less than a 5% probability that the relationship is the product of chance.[474]

217. I note that statistical significance is not the same as economic significance.[475] The inclusion of a variable in a regression model may lead to a coefficient estimate that is statistically significant (a high level of confidence), but the coefficient itself may be very small in magnitude, such that it does not exert much influence on predicted values based on the econometric model.

218. Here, a central question relates to what economic factors and considerations affect the prices DPPs pay for pork products. In connection with answering that question, I created an econometric model to identify and quantify the effect of the alleged conspiracy on pork prices. The regression model I created is a reduced-form model, which is commonly employed for estimating impact and damages in antitrust litigation.[476] My reduced form model expresses the solution to the underlying structural equations of quantity supplied and quantity demanded as a function of the outcome when supply and demand are constrained to be equal. Here, the demand equation explains a) the relationship between the quantity demanded and prices (all else equal, higher prices for pork lead to lower quantities demanded) and other changes that shift the demand curve, such as changes in GDP, and b) the relationship between quantity supplied and prices (all else equal, firms would increase the supply of pork products in

[473] *See* Damodar Gujarati, *Basic Econometrics,* 4th ed. (New York, NY: McGraw Hill, 2003), p. 18.

[474] *See* Rubinfeld, p. 320.

[475] David H. Kaye and David A. Freedman, "Reference Guide on Statistics," in *Reference Manual on Scientific Evidence,* 3rd ed., 2011, p. 252. The ABA's monograph on econometrics discusses an example scenario in which a particular elasticity is "statistically significant" but is small enough in magnitude that it is "not of much economic significance." See ABA Section of Antitrust Law, *Econometrics: Legal, Practical, and Technical Issues* 414, 2nd ed., 2014, p. 7.

[476] Jonathan Baker and Daniel Rubinfeld, "Empirical Methods in Antitrust Litigation: Review and Critique," *American Law and Economics Association* 1, no. 1 (1999): p. 391.

response to higher prices) and other factors that shift Defendants' supply curve, such as changes in a firm's marginal costs. In market equilibrium, quantity demanded equals quantity supplied. Setting the supply equation and demand equation equal, quantity drops out of the equation, and these structural equations of supply and demand can be solved and "reduced" to a mathematical solution yielding a reduced-form equation in which prices are determined by the factors that shift the supply and demand curves.

B. Dependent Variable

219. The dependent variable in each pork category model is the monthly average price paid by a particular customer. The data for the dependent variable comes from Defendants' transaction data. I understand that for initial data preparation purposes, the consulting firm OSKR was retained jointly by counsel for DPPs, Consumer Indirect Purchaser Plaintiffs, and Commercial and Institutional Indirect Purchaser Plaintiffs. Economists at OSKR worked with Defendants' individual databases to create a single "stacked" database that includes information regarding prices, sales volumes, and standardized product and customer information. Cirque Analytics staff (working under my direction) communicated with OSKR personnel throughout the database preparation process. In order for me to conduct my analysis and prepare this declaration, OSKR provided both the stacked database and the programs and backup information necessary for me and my staff to review and understand how the database was prepared from Defendants' raw production files. Staff working under my direction reviewed the programs and data I rely on in this declaration and have modified the data as appropriate.[477]

220. As noted above, OSKR created standardized information for different pork products. Observations in each Defendant's raw transaction data generally include a product code and a product description that are typically unique to that Defendant. To enable cross-Defendant analyses, OSKR relied on information from Agri Stats, as well as key words in the various product descriptions to assign standardized product categorizations. As Defendants' information was incomplete in this regard, staff working under my direction continued to refine this product standardization. Thus, my analysis of Defendants' products is ongoing, and may be updated if I receive additional information on this issue.

[477] Details can be found in my backup materials.

1. Defendant Data Availability

221. As discussed previously, Defendants produced large transactional databases reflecting their sales of pork products over time. However, the time periods spanned by individual Defendant databases varied somewhat. **Figure 64** shows the start month and end month for each Defendant's sales records.

Figure 64. Time Periods Spanned by Individual Defendant Data[478]

Defendant	Data Start Date	Data End Date	Gaps in Data / Limited Data
Clemens	May 2010	Dec 2020	Aug - Sep 2010; Dec 2010 - Jan 2011; Apr - June 2018
Hormel	Jan 2005	Dec 2020	
JBS	May 2007	Dec 2020	Apr 2007; Oct - Dec 2010
Seaboard	Jan 2005	Dec 2020	
Smithfield	Aug 2009	Dec 2020	2005 - July 2009
Tyson	Oct 2004	Dec 2020	

Note: Data Start and End Dates are based on when Defendant's data appear to be complete for the month. Tyson, for example, provided small amounts of data dated as early as 1970.

222. As shown, Hormel, Seaboard,[479] and Tyson all produced data spanning at least 2005-2020. However, Clemens did not produce any data for the critical benchmark period, and JBS produced data only for the latter part of the benchmark period (mid-2007 through 2008, and somewhat limited data for late 2010). In addition to being incomplete, JBS did not produce its data for the 2007-2009 period until the end of March 2022. Thus, rather than having ample time to clean, prepare, and evaluate this benchmark data, I have only had a single month. Accordingly, my analysis of JBS's data is ongoing, and I may update my analysis in the future as my understanding of this late-produced data develops.

223. Smithfield produced only a small and inconsistent amount of data for the benchmark period (see **Figure 65** below).[480] Further, Smithfield indicated that its data for later periods are

[478] Defendants' transaction data.

[479] Pork produced by Triumph and STF was produced in the same database as Seaboard's.

[480] Smithfield's limited data for the benchmark period comes mostly from the Legacy Farmland Foods and Pine Ridge Farms production (2005–2008), along with 814 Americas and very limited John Morrell production for 2008. See backup production. Through their Counsel, Smithfield stated that the data from ERP system of 814 Americas (Sage) are not available before January 16, 2008; and data from ERP system (Canopy) for Kansas City Sausage Co. do not exist for the period from January 1, 2005, through January 27, 2009. Email from Brian Robison, Gibson Dunn, to Michael Moskovitz and others, "RE: Pork - Smithfield's Structured Data Production," May 25, 2021.

incomplete—especially for the 2009–2014 period.[481] The sparseness and inconsistent nature of Smithfield's data makes assessing the reliability of what data do exist difficult.

Figure 65: Smithfield Data Available for Regression[482]

Year	Number of Regression Obs	Number of Transactions	Net Amount ($)	Quantity (Lbs.)
2005	93	173	$ 602,164	389,774
2006	1,421	3,319	$ 4,637,213	2,737,680
2007	2,630	5,971	$ 8,469,227	4,621,638
2008	4,852	11,602	$ 69,200,173	77,463,519
2009	19,702	229,372	$ 547,232,246	437,786,216
2010	40,440	362,649	$ 1,387,667,476	929,850,157
2011	36,254	328,429	$ 1,312,274,370	772,774,296
2012	34,208	320,052	$ 1,382,566,867	868,968,705
2013	60,400	773,368	$ 2,023,488,081	1,094,328,879
2014	83,755	993,082	$ 2,927,746,743	1,396,912,639
2015	106,650	1,451,304	$ 3,629,879,393	2,080,799,114
2016	105,469	1,537,128	$ 3,543,898,958	2,043,620,972
2017	101,190	1,588,550	$ 3,621,766,830	1,998,637,501
2018	100,805	1,508,177	$ 3,670,042,595	2,048,178,201
2019	88,130	1,192,213	$ 3,631,307,767	1,901,308,262
2020	66,662	889,233	$ 3,028,361,488	1,535,642,614
Avg. 2005-2008	2,249	5,266	$ 20,727,194	21,303,153
Avg. 2009-2014	45,793	501,159	$ 1,596,829,297	916,770,149
Avg. 2015-2020	94,818	1,361,101	$ 3,520,876,172	1,934,697,777

224. My examination of the data Defendants did produce suggests that there is potentially missing data (aside from missing years of data) for relevant Class Products. For example, JBS's data includes almost no sales of bacon, with the only observations appearing briefly in 2016-2017.[483] The Seaboard sales data indicates whether a particular transaction was processed at Seaboard's own facility, at Triumph's, or at their joint venture STF. This sales database shows

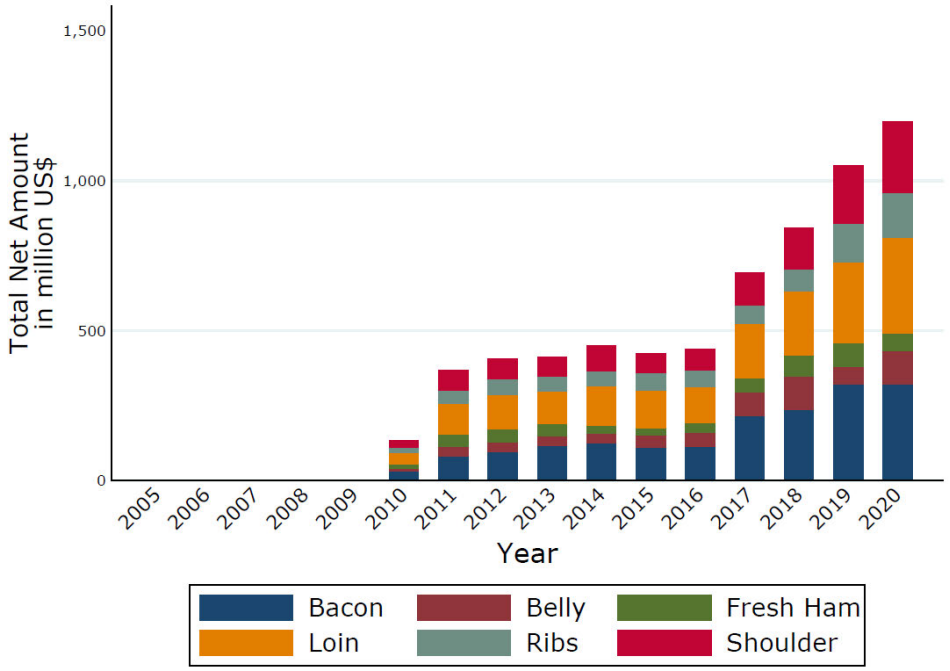
[481] Through their Counsel, Smithfield confirmed limited data productions for Legacy Farmland Foods sales data prior to 2015, as well as limited Smithfield Packing data for 2014, also stating that "additional invoice data relevant to the litigation is not available." Letter from Joshua Lipton, Gibson Dunn, to Bobby Pouya, Pearson Simon Warshaw, "Re: *In Re Pork Antitrust Litigation* - Smithfield and Smithfield Legacy Data," Nov. 3, 2021, p. 2.

[482] Smithfield transaction data. See backup production.

[483] I understand that JBS did not sell bacon prior to its acquisition of Cargill in 2015; since I have no sales data for Cargill, I have no bacon data for either entity prior to 2015. Further, I understand that starting in 2017, JBS's bacon was made and sold through Plumrose (its subsidiary). However, since Plumrose's bacon sales are not available, and JBS's sales of bellies to Plumrose are excluded (due to being intra-company sales), this commerce is effectively eliminated from the analysis.

no bacon for either Triumph or STF facilities, and only limited bacon for Seaboard's facility (almost none of which is during the benchmark or after 2014).[484] The data produced by Smithfield prior to 2014-2015 is limited in ways that make it impossible to tell if the missing data affects all Class Products proportionately or if certain cuts are more affected than others. The figures below show the composition of each Defendants' sales records for Class Products over time.[485]

Figure 66. Breakdown of Total Net Amount by Year – Clemens[486]



[484] I understand that for Seaboard bacon was primarily produced by Daily's Premium Meats, and Seaboard provided data for the sales associated with its former division – Daily's Premium Meats – only covering years 2007 through 2014, stating that these "are the only years for which Seaboard maintains reliable data for those sales." Letter from J. Nicci Warr, Stinson, to Michael Moskovitz, Freed Kanner London & Millen LLC, "Re: *In re Pork Antitrust Litigation,* Case No. 0:18-cv-01776-JRT-HB (D. Minn.)", May 20, 2021, p. 2.

[485] I split the Seaboard database into Seaboard, Triumph, and STF for illustrative purposes in these figures. I understand that Seaboard is responsible for the sales and marketing of all pork processed at each facility. In my analysis of overcharges below, these entities are treated jointly.

[486] Defendants' transaction data.

Figure 67. Breakdown of Total Net Amount by Year – JBS[487]

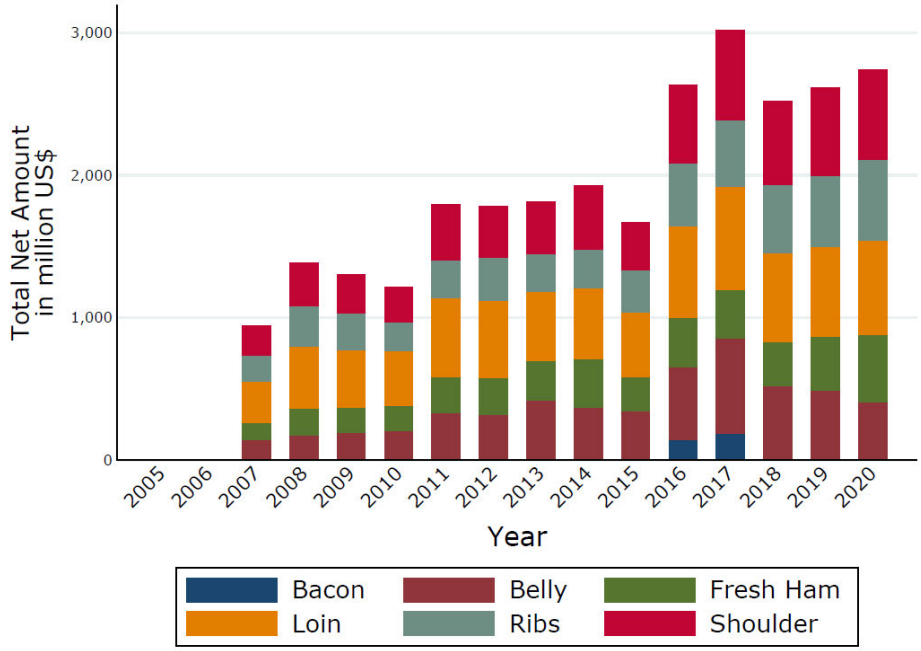
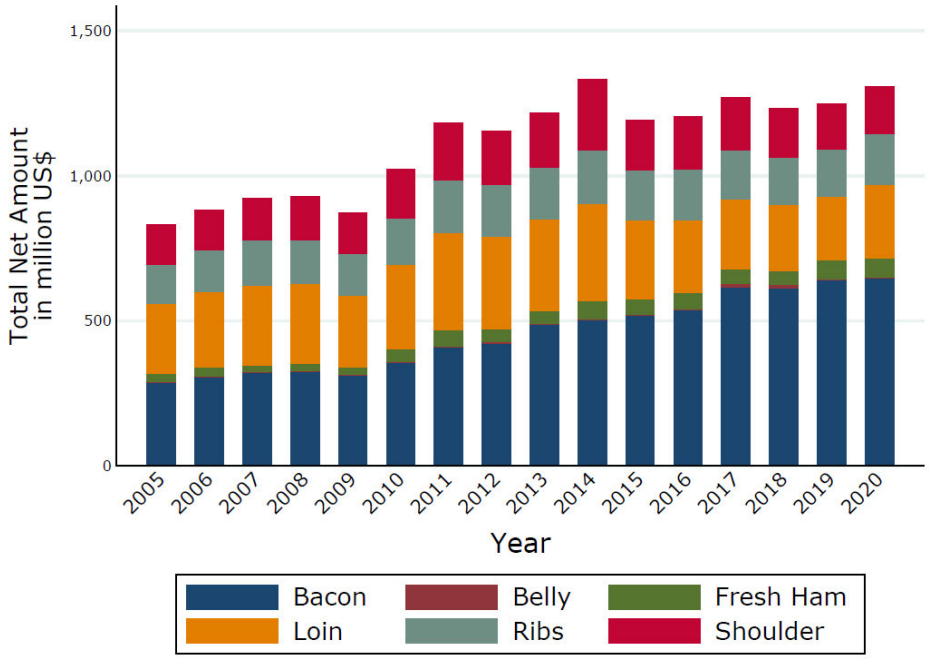


Figure 68. Breakdown of Total Net Amount by Year – Hormel[488]



[487] Defendants' transaction data.

[488] Defendants' transaction data.

Figure 69. Breakdown of Total Net Amount by Year – Triumph[489]

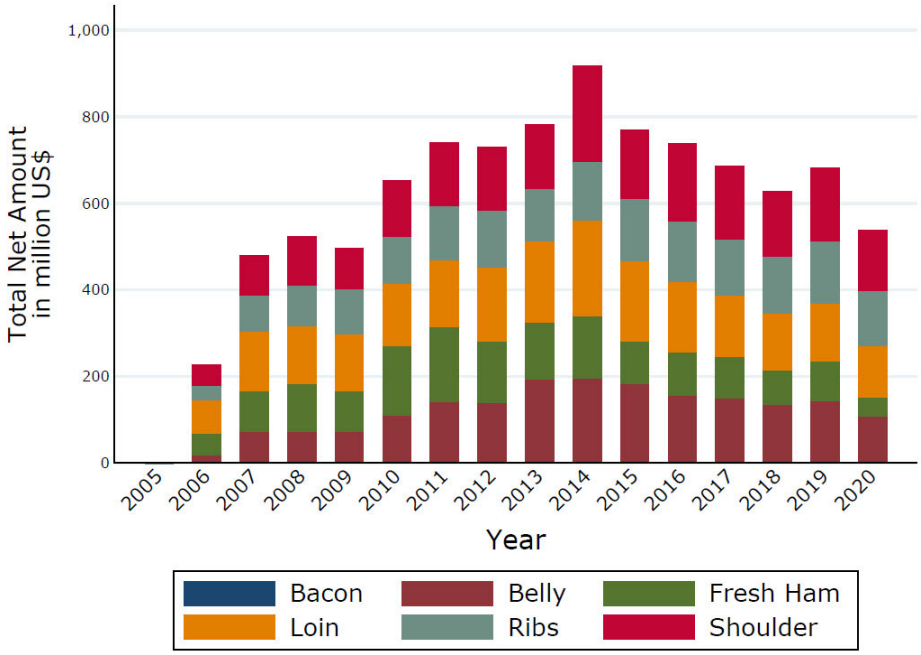
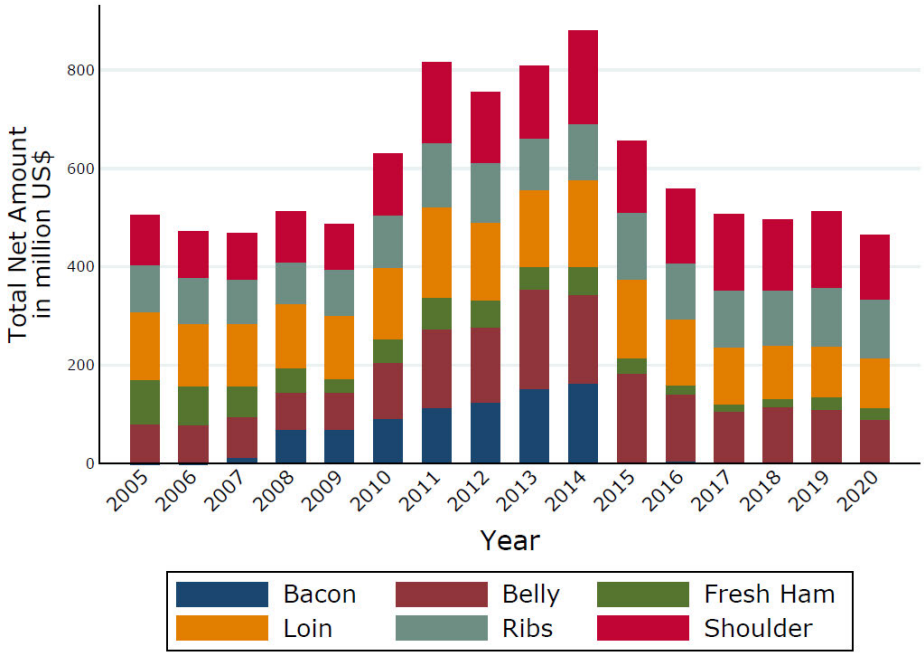


Figure 70. Breakdown of Total Net Amount by Year – Seaboard[490]



[489] Defendants' transaction data.

[490] Defendants' transaction data.

Figure 71. Breakdown of Total Net Amount by Year – STF[491]

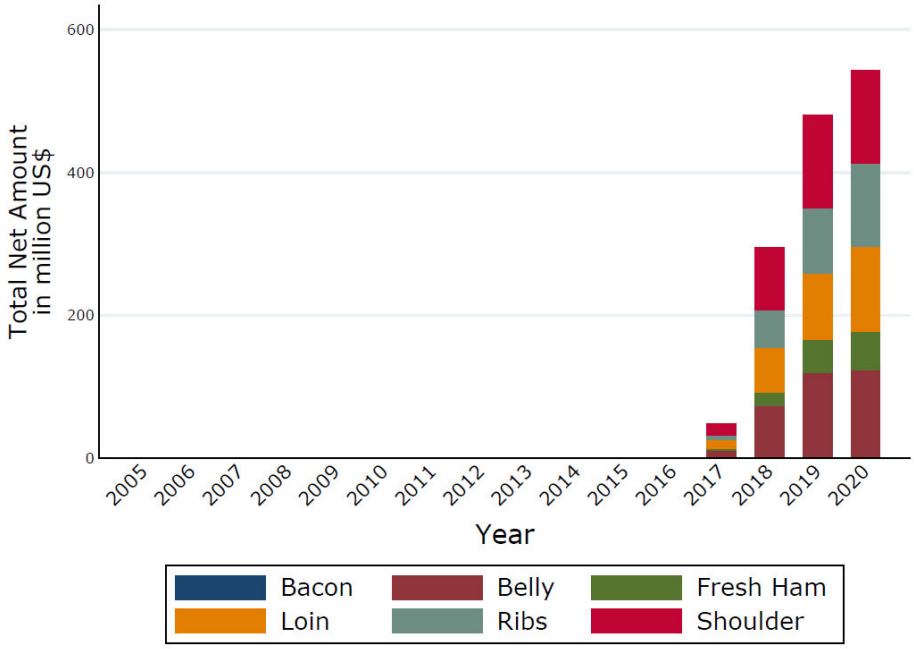
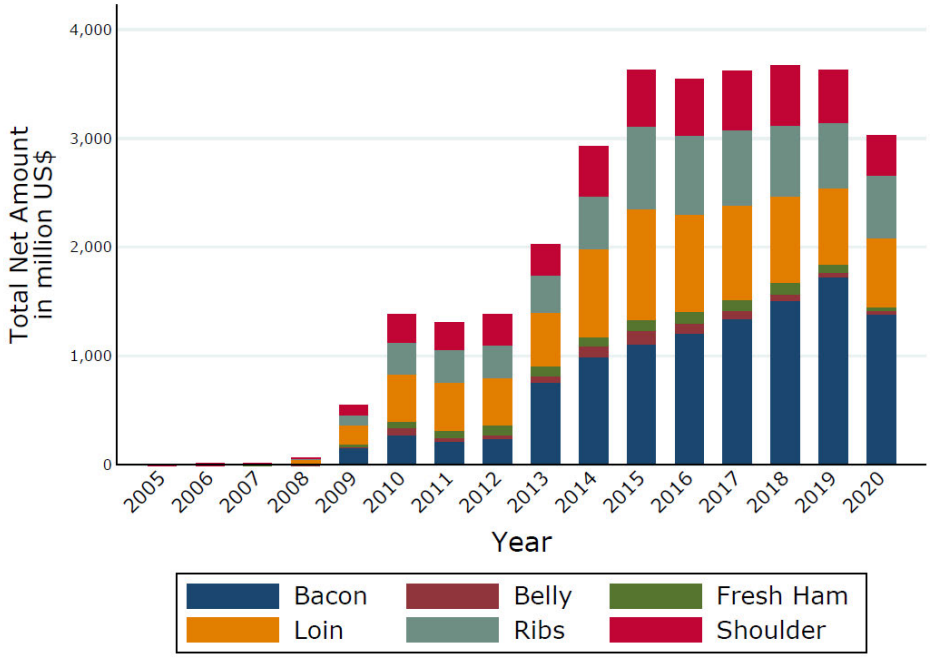


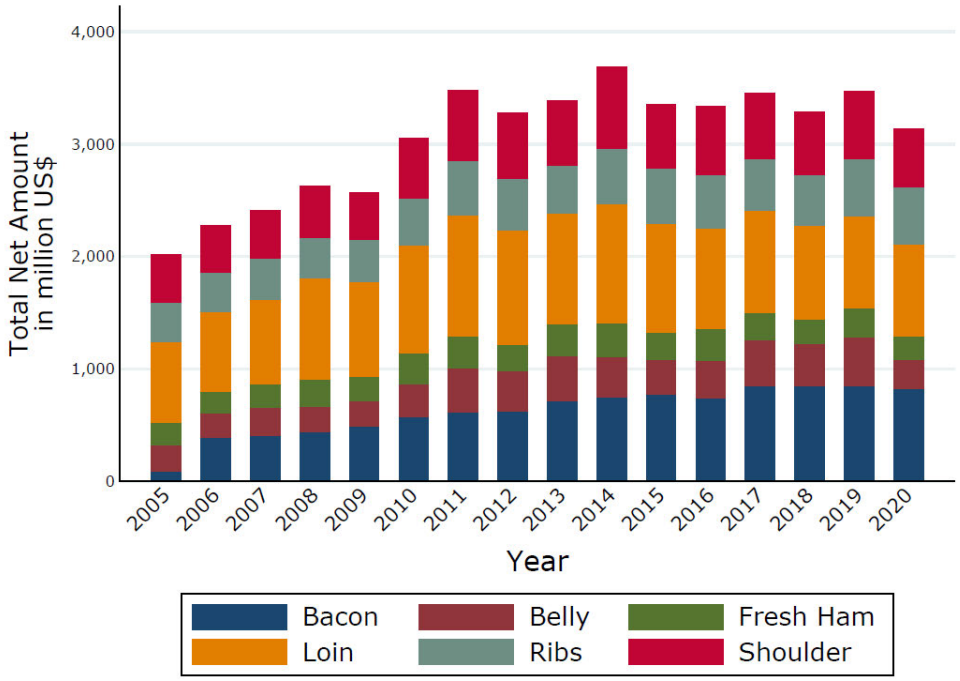
Figure 72. Breakdown of Total Net Amount by Year – Smithfield[492]



[491] Defendants' transaction data.

[492] Defendants' transaction data.

Figure 73. Breakdown of Total Net Amount by Year – Tyson[493]



225. The figures above suggest that Defendants' production of sales data—especially with respect to bacon—is incomplete.

2. Relevant Price Calculation

226. The dependent variable in each pork category model is the monthly average price paid by a particular customer for a particular product (within that product category). The customers included in the model are all those DPPs that are identifiable by the customer name information provided in Defendants' transaction data.[494] To facilitate the interpretation of certain coefficients, the price paid has been transformed into the natural log form.[495]

[493] Defendants' transaction data.

[494] I understand that OSKR has undertaken efforts to standardize and remove duplicate customer names. I have relied on this standardization in my analysis. If additional information regarding customer names or affiliations becomes available, I will update my analysis appropriately.

[495] The use of natural log forms allows for coefficients to be interpreted as elasticities, or as percentage changes, rather than changes in levels. For example, it allows for coefficients on variables like costs or an overcharge indicator to be interpreted as a percentage instead of in dollars (or cents).

227. As part of "cleaning" the data used in my analysis, I undertook appropriate measures to remove extreme or "outlier" observations, inter- and intra-Defendant sales, sales of non-Class Products, and other non-Class sales records, such as sales outside of the United States.[496]

228. To the extent I could identify certain "non-sale" transactions in the Defendants' data (e.g., returns, rebates, credit and debit memos), I removed them from calculations of the average monthly prices for the regression. This was necessary because Defendants often did not provide sufficient information to apply these adjustments to a particular transaction. Because the observations for the dependent variables are specific to a product and customer combination, the dependent variable does not average across products or across customers.

C. Benchmark & Conspiracy Periods

229. The econometric model I use in this case is a "benchmark" model. The use of such a model is standard practice in antitrust analysis.[497] In such a model, prices during the period alleged to be affected by the conspiracy are compared to prices during a "benchmark" period, which is assumed to be unaffected by the conspiracy. A variable is included in my model to identify these different periods, as explained below.

1. Conspiracy Period Indicators

230. My econometric models are designed to determine impact and estimate the overcharges for each product category using binary indicator (or "dummy") variables. As suggested by the name, binary variables take on the value of either 0 or 1, depending on whether a given condition is met. For observations outside of the Conspiracy Period, the Conspiracy Period indicator has a value of 0; for observations inside the Conspiracy Period, the indicator has a value of 1.

[496] See backup production.

[497] Jonathan Baker and Daniel Rubinfeld, "Empirical Methods in Antitrust Litigation: Review and Critique," *American Law and Economics Review* 1, no. 1 (1999): pp. 391–393; Justin McCrary and Daniel Rubinfeld, "Measuring Benchmark Damages in Antitrust Litigation," *Journal of Econometric Methods* 3, no. 1 (2014): 63–74 ("We have found the benchmark approach to be the most commonly used damages methodology"); Daniel Rubinfeld, "Antitrust Damages," in *Research Handbook on the Economics of Antitrust Law,* ed. Einer Elhauge, 2009.

a. Conspiracy Period Indicator

231. As discussed previously in this report, Defendants were making public statements about the need to reduce pork production in 2008.[498] However, the calls to action from Defendants in 2008 may not have had an immediate impact in the market, especially those related to reductions to sow herds. Given the gestation, farrowing, and finishing times required for pork production, a reduction in sows may not lead to an immediate decrease in hogs or pork available for sale. Thus, the date that Defendants allegedly began conspiring need not coincide with the date on which the alleged conspiracy would have actually led to an impact on prices. I relied on USDA data to investigate how the domestic supply of pork changed over time. **Figure 74** shows the year-over-year change in quarterly production from January 2007 through December 2015.

[498] Complaint, ¶¶ 124–141.

Figure 74. Year-Over-Year Change in Pork Production, 2007Q1 – 2015Q4[499]

	Year-Over-Year Change	
Year-Qtr	**Production**	**Domestic Supply**
2007Q1	1%	1%
2007Q2	2%	5%
2007Q3	3%	3%
2007Q4	10%	8%
2008Q1	12%	7%
2008Q2	9%	-5%
2008Q3	7%	-1%
2008Q4	-1%	-3%
2009Q1	-3%	-3%
2009Q2	-2%	8%
2009Q3	1%	4%
2009Q4	-2%	-3%
2010Q1	-4%	-5%
2010Q2	-3%	-7%
2010Q3	-5%	-5%
2010Q4	2%	2%
2011Q1	2%	-2%
2011Q2	1%	-1%
2011Q3	2%	-5%
2011Q4	1%	-6%
2012Q1	2%	-1%
2012Q2	3%	1%
2012Q3	3%	4%
2012Q4	1%	3%
2013Q1	-1%	3%
2013Q2	0%	2%
2013Q3	0%	1%
2013Q4	0%	2%
2014Q1	0%	-4%
2014Q2	0%	-3%
2014Q3	-4%	-3%
2014Q4	-2%	0%
2015Q1	7%	13%
2015Q2	8%	10%
2015Q3	10%	12%
2015Q4	5%	5%

232. As shown, domestic pork supply dropped slightly during 2008, but rebounded somewhat through the two quarters in the middle of 2009. However, domestic pork supplies fell every quarter starting in late 2009 until mid-2012. In other words, this data is consistent with the allegation that Defendants began conspiring by early 2009, but that—due to the seasonality of

[499] *USDA Meat Supply and Disappearance.*

farrowing cycles and hog production—the early effects of the alleged conspiracy did not begin until the fall harvest. Accordingly, while I use January 2009 as the starting point for my Conspiracy Period indicator variable, this may be a conservative starting point for the analysis.[500] The Conspiracy Period indicator variable ends after June 30, 2018, when the DPP Class Period ends.

b. Appropriate Benchmark Period

233. To identify and measure the effect of the alleged conspiracy, I compared Defendants' prices during the Conspiracy Period to Defendants' prices during a benchmark period presumably unaffected by the alleged misconduct. Here, I chose a benchmark period from January 2005 (the earliest date that multiple Defendants produced transactional data) through December 2008.[501] I have sufficient, if not complete, data for this period from several Defendants, including Hormel, Tyson, and Seaboard.[502] Although there are considerable flaws and shortcomings with respect to the benchmark period in the JBS, Smithfield, and Clemens data, I have nevertheless included their data in my model. In a subsequent section, I discuss the results of a regression model which excludes these entities.

234. Defendants produced transaction data beyond the end of the Class Period and into 2020. While the DPP Class Period ends after June 2018, I do not treat data after this point in time as pure benchmark. It is not my opinion that the end of the Class Period necessarily equates to an end of the alleged conspiracy or its effects. It is my understanding that discovery beyond mid-2018 is unavailable. Because of the possibility that prices from this "post-period" remain higher than competitive prices as a result of ongoing conspiratorial actions, or due to "lingering effects" of the alleged conspiracy, treating it as benchmark data in this case would be inappropriate.[503]

---

[500] That is, if prices were already elevated before January 2009 due to cuts in production, my model would treat such elevated prices as "benchmark" prices, against which further prices would be analyzed. This would have the effect of lowering the estimated overcharge.

[501] While Tyson produced data from a couple of months at the end of 2004, no other Defendant produced data prior to 2005. This fact, combined with a data limitation on another variable in my model (related to piglet mortality) is cause for me to start my model in January 2005.

[502] The Seaboard sales database also includes records for Triumph and STF.

[503] Joseph Harrington, "Post-Cartel Pricing During Litigation," *Journal of Industrial Economics* 52, no. 4 (Dec. 2004): pp. 517–533.

Therefore, I include data after the end of the Class Period in my model, but also include a "post-period" indicator variable.

D. Explanatory Variables

235. Aside from the binary indicator variable related to the Conspiracy and "post" periods discussed above, my proposed regression model includes appropriate explanatory supply and demand variables to account for non-collusive factors that the evidence in this case, as well as economic theory, indicate would impact prices for pork products.

1. Cost Variables Related to Making Pork Products

236. For my regression model, I use two different cost variables—one related to the cost of raising hogs, and one related to the cost of processing and packing pork products. Specifically, I use the hog cost data estimated and maintained by Iowa State University.[504] This monthly data spans the entire period of analysis and incorporates the costs associated with raising market hogs, such as feed prices, the veterinary services, labor, and other hog-raising costs.[505] To account for additional processing and packing costs associated with producing pork products, I use Agri Stats data on plant costs.[506] Each of these variables are used in my model in natural log form.

2. Seasonal Effects

237. Pork prices exhibit some degree of seasonality, and there are both supply- and demand-oriented elements to it. On the supply side, temperature and feed costs fluctuate, which affects farrowing and hog growth.[507] The combination of these factors leads to larger volumes of hogs reaching desirable market weights in the fall, and therefore higher hog slaughter and pork

[504] While these data are publicly available, I note that versions of these data were included in Defendant production, as well. *See, e.g.,* TF-P-001807247–248 (email thread discussing use of these data); TF-P-001807251–252; CLMNS-0000333109–117; HFC-PORKAT0000010490–492; SMITHFIELD04848737–738 (multi-tab spreadsheet with an "ISU" tab that contains ISU cost data from 2000 through early 2013).

[505] *See* Lee Schulz, "Procedure for Estimating Returns Farrow to Finish," *Iowa State University,* Jan. 2014, http://www2.econ.iastate.edu/estimated-returns/

[506] Because these data were produced by Agri Stats only from 2007 through early 2019, I use information on slaughterhouse labor costs to estimate for missing time periods. See backup production.

[507] *See* Lee Schulz, "Seasonal Hog Price Patterns," Iowa State University, accessed Apr. 11, 2022, https://www.extension.iastate.edu/agdm/livestock/html/b2-14.html; The Pig Site, "CME: Seasonal Patterns Determine Hog Production," Oct. 31, 2008, https://www.thepigsite.com/news/2008/10/cme-seasonal-patterns-determine-hog-production-1.

production in those months, which can contribute to seasonal changes in price.[508] There are also seasonal changes in consumer demand. For example, documents indicate that a) demand for ham rises during certain holiday time periods and b) demand for roast-like products may exhibit higher demand during the fall and late winter.[509] My regression model therefore includes indicator variables for each month of the year. Because the seasonal effects may differ somewhat by pork product, such indicators may not exhibit the same explanatory power in each model, and the estimated coefficients for each month may differ across models. I use the month of January as the base month and use 11 indicator variables for the remaining months.[510]

3. Competing Proteins

238. Economic theory suggests that prices and demand for a good may be influenced, at least to some degree, by prices for products that exhibit some level of economic substitutability. Documents and research propose that, in general, pork demand may be affected by prices for competing proteins like beef and chicken.[511] Other things equal, if these proteins are substitute goods, demand for pork would be expected to increase as beef and/or chicken prices increase relative to pork. In order to control for the impact of competing protein prices on pork, I obtained historical pricing data for beef and chicken and include a weighted-average combination of these variables in my model.[512]

---

[508] *Id.*

[509] *See, e.g.,* Lee Schulz, "Seasonal Hog Price Patterns," Iowa State University, accessed Apr. 11, 2022, https://www.extension.iastate.edu/agdm/livestock/html/b2-14.html; The Pig Site, "CME: Seasonal Patterns Determine Hog Production," Oct. 31, 2008, https://www.thepigsite.com/news/2008/10/cme-seasonal-patterns-determine-hog-production-1; Michael Hirtzer, "Hog Prices Hit Seven-Year Hihg on Grilling-Season Pork Demand," *Bloomberg,* May 21, 2021, *available at* https://www.bloomberg.com/news/articles/2021-05-21/grilling-season-demand-for-pork-has-hogs-at-seven-year-high.

[510] When using indicator variables to control for a qualitative variable like "month," it is necessary to omit one indicator that serves as a "base" or point of comparison for the other months. More generally, if a qualitative variable has *m* categories (e.g., month values), then a regression model can only use *m*-1 indicators for that variable, or it will lead to perfect multicollinearity, which will prevent the regression from being run at all. In this case, there are 12 months and therefore only 11 indicator variables. See Damodar Gujarati, *Basic Econometrics*, 4th ed. (New York, NY: McGraw Hill, 2003), pp. 301–302.

[511] Meyer and Goodwin, p. 15; Christopher Davis and Biing-Hwan Lin, "Factors Affecting U.S. Pork Consumption," USDA, May 2005, https://www.ers.usda.gov/webdocs/outlooks/37377/15778_ldpm13001_1_.pdf?v=1036.8; AGSTAT-P-0003380282–301; AG-STAT-P-0003384656; AGSTAT-P-0003379897.

[512] The combined beef and chicken index uses USDA monthly retail prices, and is a weighted average value based on each protein's relative importance in the BLS Consumer Price Index from 2004-2021. The series is used in natural log form and is also lagged one month to allow pork prices to respond to changes in retail beef and chicken prices.. See backup production.

239. I do not include this variable in my model when estimating overcharges for bacon or belly due to the lack of economic substitutability with other proteins.[513] Belly is sold primarily to processors (or retained by Defendants) as an input to make bacon, and Defendant documents indicate that demand for bellies is just an extension of demand for bacon.[514] Because bacon itself is a pork product, beef and chicken (which are not pork) cannot be used to make bacon. While bacon, beef, and chicken could be substitutes in limited scenarios (e.g., a BLT sandwich versus a chicken sandwich versus a cheeseburger), bacon is more commonly consumed as an accessory or accompaniment to other foodstuffs. Indeed, Defendant and industry documents emphasize that there is "no viable substitute for bacon."[515]

4. Macroeconomic Controls

240. My econometric model includes a measure of GDP (in natural log form) to account for changes over time in demand though rising (or falling) income, as well as macroeconomic phenomena like recessionary periods. Other things equal, increases in a variable like GDP would be expected to increase demand; however, because some pork products are more expensive or valuable than others, an increase in wealth or income may lead to demand-side substitution, especially when taking into account substitutability with other proteins like chicken or beef.

241. My econometric model also includes the monthly US consumer price index ("CPI") to account for the role of inflation over time, and an indicator variable corresponding to the onset of the COVID-19 pandemic and the temporary disruption in pork production it caused. Based on USDA production data, actual pork production declined sharply in April and May 2020, and then rebounded strongly in June.[516] However, temporary panic about food availability in the

[513] Notably, a 2014 JBS analysis of cross-price elasticities using Nielsen data for various cuts of pork, beef, and chicken does not even include bacon. See JBS-PORK-00254722.

[514] In a 2017 document, Steve Meyer (while responding to reports of an "alleged bacon shortage") that "a huge decline in bellies stocks can mean only one thing—excellent belly demand. Excellent belly demand is, in turn, the result of bacon demand…Domestic bacon demand is the main driver of belly demand." See AGSTAT-P-0003407944-3407946.

[515] See TF-P-001889329-1889346 at 1889345 (Tyson Q3 earnings call, stating that performance for bellies "will be ok as there is not a viable substitute for bacon."). See also JBS-PORK-01992804 (an article quoting the University of Missouri's Ron Plain's explanation for rising cold storage inventories of belly. Per Plain, this was because "peak demand for bacon come in late summer…so firms are stockpiling pork bellies to make sure they don't run out of bacon…Because there is no substitute for bacon.").

[516] *See, e.g.,* Samantha Padilla et al., "COVID-19 Working Paper: Changes in Regional Hog Slaughter During COVID-19," USDA, Paper #AP-095, Dec. 2021, https://www.ers.usda.gov/webdocs/publications/102784/ap-

United States began earlier in March.[517] Therefore, my econometric model includes an indicator variable that takes on the value of 1 between March and June 2020, and 0 in all other periods.

5. Product and Customer Characteristics

242. My econometric models also include fixed effects to account for differences in prices because of qualitative attributes of individual products or customers.[518] Specifically, I include indicator variables for each combination of a) Defendant, b) product, and c) customer.[519] Products are identified using the product or item numbers found in each Defendant's sales records. Customers are identified based on the standardization of customer names contained in the data I received from OSKR, which reflects the bill-to customer where available and the ship-to customer whenever bill-to is not available.

6. Additional Control Variables

243. My econometric model accounts for other factors that are not necessarily reflected in the supply and demand controls discussed above.

a. Swine-Flu Outbreak of 2009-2010

244. During 2009 and 2010 an outbreak of swine flu led to a disruption in the pork industry. It is my understanding that swine flu is not spread to humans by swine, and consumption of pork is not related to swine flu infection.[520] I also understand that a) the swine flu outbreak in 2009

095.pdf?v=431.1. The paper notes that slaughter "in the major pork-producing regions declined for three weeks at the end of April and early May but recovered to 2019 levels by June 2020." See also Ryan McCarthy and Sam Danley, "Map: COVID-19 Meat Plant Closures," Meat + Poultry, June 23, 2020, https://www.meatpoultry.com/articles/22993-covid-19-meat-plant-map.

[517] *See, e.g.,* Fredrick Kunkle and Michael E. Ruane, "Coronavirus triggers run on grocery stores, with panic-buying, hoarding and some fighting, too," *Washington Post,* Mar. 13, 2020, https://www.washingtonpost.com/dc-md-va/2020/03/13/coronavirus-triggers-run-grocery-stores-with-panic-buying-hoarding-some-fighting-too/; Michael Corkery, David Yaffe-Bellany, Amelia Nierenberg and Quoctrung Bui, "There Is Plenty of Food in the Country," *New York Times,* Mar. 15, 2020, https://www nytimes.com/2020/03/15/business/coronavirus-food-shortages html.

[518] "Fixed effect" is another term for a binary, indicator, or dummy variable.

[519] The Defendant is included in the unique product identifier in order to control for the instances where two different processors use the same product code.

[520] *See* CDC, "What People Who Raise Pigs Need To Know About Influenza (Flu)," Aug. 19, 2014, accessed Apr. 19, 2022, https://www.cdc.gov/flu/swineflu/people-raise-pigs-flu.htm (noting that "Flu viruses in pigs have not been shown to be transmissible to people through eating properly handled and prepared pork (pig meat) or other products derived from pigs.").

caused considerable confusion or concern among consumers about the safety of eating pork, and b) also led to many countries temporarily banning pork imported from the United States.[521] Such a reaction could affect both the domestic supply of pork (export reductions) and the domestic demand for pork (negative consumer beliefs), and therefore potentially affect the price of pork sold in the marketplace. Therefore, my econometric model includes an indicator variable corresponding to the period of June 2009 through August 2010.

b. Piglet Mortality

245. In the spring of 2013, the porcine epidemic diarrhea virus ("PEDv") was first discovered in the United States.[522] Over the following year, many hog growers experienced significant losses of piglets.[523] Other things equal, an increase in piglet mortality would reduce the volume of market hogs available and lead to higher prices for pork. In order to account for this, as well as other instances of higher piglet mortality, I include a variable that tracks piglet morality rates over time in my model.

E. Direct Overcharge Model Results

246. I estimated a regression model separately for loins, shoulders, bellies, ribs, fresh ham, and bacon. **Figure 75** below shows the results of each estimation. The overcharge coefficients are positive and statistically significant for all individual cuts, with belly showing the highest

[521] *See* Andreas Kruck et al., "What Went Wrong? The World Health Organization from Swine Flu to Ebola," National Library of Medicine, Oct. 9, 2017, https://www ncbi.nlm.nih.gov/pmc/articles/PMC7122988/. The authors state that after the World Health Organization adopted the name "swine flu" for the disease, many countries (including China and Russia) responded by culling swine herds and imposing importation bans on pork.

[522] Iowa State University, "Porcine Epidemic Diarrhea," Iowa State University, accessed Apr. 19, 2022, https://vetmed.iastate.edu/vdpam/FSVD/swine/index-diseases/porcine-epidemic-diarrhea; USDA, "Porcine Epidemic Diarrhea Virus (PEDv) Summary of Actions," *available at* https://www.usda.gov/sites/default/files/documents/pedv-summary-actions.pdf (noting that "Federal, State, and industry actions" began in approximately May 2013 to combat PEDv). *See also* Betsy Freese, "Pork Powerhouses 2013: Disease Hits, Growth Continues," Successful Farming, Sept. 30, 2013, *available at* https://www.agriculture.com/livestock/hogs/pk-powerhouses-2013-disease-hits-growth_283-ar34203 (noting that "In May, a deadly viral disease never before seen in the U.S. broke in farrowing barns in Colorado).

[523] *See, e.g.,* South Dakota State University, "Three Million Pigs Possibly Lost Due to PEDV," Jan. 6, 2014, https://www.nationalhogfarmer.com/health/three-million-pigs-possibly-lost-due-pedv (citing South Dakota State University Extension Services for an estimate of three million pigs by January 2014); Stephanie Strom, "Virus plagues the pork industry and environmentalists," *New York Times,* July 4, 2014, https://www.nytimes.com/2014/07/05/business/PEDv-plagues-the-pork-industry-and-environmentalists.html. The article quotes the NPPC as saying that "it had heard that about eight million pigs had died."

overcharge at 19.1%, followed by bacon (13.9%) shoulder (11.5%), and ribs (8.0%). The lowest overcharges are for fresh ham (4.7%) and loin (4.3%).

Figure 75. Direct Overcharge Model Results – All Defendant Data[524]

	BACON			BELLY			FRESH HAM			LOIN			RIBS			SHOULDER		
Explanatory Variables [1]	Est	Se		Est	Se		Est	Se		Est	Se		Est	Se		Est	Se	
Competing Proteins Index							0.50	0.01	*	0.48	0.00	*	0.78	0.01	*	0.35	0.01	*
GDP	0.94	0.02	*	1.66	0.09	*	0.77	0.08	*	0.25	0.02	*	0.54	0.03	*	1.20	0.03	*
ISU Hog Cost	0.11	0.00	*	0.31	0.01	*	0.54	0.01	*	0.49	0.00	*	0.24	0.00	*	0.48	0.00	*
Agri Stats Plant Cost	0.10	0.01	*	0.19	0.02	*	1.21	0.02	*	0.56	0.01	*	0.72	0.01	*	0.66	0.01	*
Swine Flu Indicator	(0.14)	0.00	*	(0.15)	0.00	*	0.02	0.00	*	(0.02)	0.00	*	(0.05)	0.00	*	(0.07)	0.00	*
Consumer Price Index	0.00	0.00	*	(0.00)	0.00	*	(0.03)	0.00	*	(0.03)	0.00	*	(0.03)	0.00	*	(0.03)	0.00	*
Piglet Loss	1.05	0.01	*	0.90	0.03	*	3.05	0.03	*	1.40	0.01	*	0.51	0.02	*	2.96	0.02	*
January Indicator	-	-		-	-		-	-		-	-		-	-		-	-	
February Indicator	0.01	0.00	*	0.01	0.00	*	(0.02)	0.00	*	(0.01)	0.00	*	0.02	0.00	*	(0.05)	0.00	*
March Indicator	0.01	0.00	*	0.01	0.00	*	(0.03)	0.00	*	(0.01)	0.00	*	0.03	0.00	*	(0.03)	0.00	*
April Indicator	0.02	0.00	*	0.00	0.00		(0.03)	0.00	*	0.01	0.00	*	0.03	0.00	*	(0.00)	0.00	*
May Indicator	0.03	0.00	*	0.04	0.00	*	0.04	0.00	*	0.06	0.00	*	0.06	0.00	*	0.09	0.00	*
June Indicator	0.06	0.00	*	0.09	0.00	*	0.07	0.00	*	0.06	0.00	*	0.04	0.00	*	0.11	0.00	*
July Indicator	0.09	0.00	*	0.13	0.00	*	0.10	0.00	*	0.06	0.00	*	0.00	0.00		0.11	0.00	*
August Indicator	0.12	0.00	*	0.12	0.00	*	0.17	0.00	*	0.09	0.00	*	0.01	0.00	*	0.13	0.00	*
September Indicator	0.08	0.00	*	0.04	0.00	*	0.17	0.00	*	0.07	0.00	*	(0.02)	0.00	*	0.12	0.00	*
October Indicator	0.06	0.00	*	0.05	0.00	*	0.19	0.00	*	0.08	0.00	*	(0.00)	0.00	*	0.12	0.00	*
November Indicator	0.05	0.00	*	0.01	0.00	*	0.18	0.00	*	0.03	0.00	*	0.01	0.00	*	0.10	0.00	*
December Indicator	0.02	0.00	*	(0.01)	0.00	*	0.11	0.00	*	(0.00)	0.00	*	(0.01)	0.00	*	0.06	0.00	*
Jan 2009-Jun 2018 Period Indicator	0.15	0.00	*	0.21	0.01	*	0.05	0.00	*	0.04	0.00	*	0.08	0.00	*	0.12	0.00	*
Jan 2009-Jun 2018 Overcharge Rate [2]	13.9%			19.1%			4.7%			4.3%			8.0%			11.5%		
Jul 2018-Dec 2020 Period Indicator	0.11	0.00	*	0.12	0.01	*	(0.03)	0.00	*	0.00	0.00		0.08	0.00	*	0.04	0.00	*
Covid Indicator	0.01	0.00	*	(0.07)	0.01	*	(0.09)	0.01	*	0.15	0.00	*	0.01	0.00	*	0.09	0.00	*
Adjusted R^2	0.88			0.81			0.82			0.93			0.93			0.81		
Number of Observations [3]	1,095,649			130,580			191,479			931,945			572,915			603,865		
Benchmark Period	*January 1, 2005 through December 31, 2008*																	
Conspiracy Period	*January 1, 2009 through June 30, 2018*																	
Class Period	*June 29, 2014 through June 30, 2018*																	

Notes:

Standard errors are calculated by using clusters of Defendant, product code and customer. * denotes statistical significance at p<0.05.

[1] Coefficient estimates for the constant and Defendant-product code-customer fixed effects are not reported.

[2] Each Period Overcharge Rate is calculated by the following formula that accounts for the semi-log functional form of the regression model:

$$1 - \frac{1}{exp^{(Period\ Indicator\ -0.5\times Var(Period\ Indicator))}}$$

[3] Number of observations reflect unique combinations of Defendant - product code - customer - month values.

[524] See backup production.

247. The signs on explanatory variables largely conform to expectations. For example, the coefficients on GDP and costs are positive in all models. Similarly, the coefficient related to piglet loss is positive—this is consistent with the expectation that higher losses due to PEDv or similar outbreaks would lower supply and increase costs and prices, and the coefficient on the substitute protein variable is positive. Monthly effects vary by cut, which is also expected given that different cuts of pork have different seasonal demands. The coefficient on the variable controlling for the economic shutdown due to COVID in 2020 varies by cut, which is also expected. Demand for pork sold into retail channels increased sharply in early 2020, while demand for pork products sold into further processing channels temporarily declined during that period. Thus, it is reasonable to expect that COVID would positively impact prices for, say, loins, while negatively impact prices for, say, bellies.

1. Further Analysis

248. As noted previously, Clemens did not produce any data for the benchmark period, and Smithfield and JBS produced severely limited data during this period. The regression results above nevertheless include their data. In order to determine whether the inclusion of this data has an impact on the results, I have re-estimated overcharges using a version of my model that excludes Smithfield, Clemens, and JBS entirely. As shown in **Figure 76**, excluding these Defendants from the regression model does not substantially affect the resulting outcomes. The overcharges for some cuts increase slightly (bacon, belly, fresh ham, and loin) and decrease slightly for others (ribs, and shoulder). These results are evidence of the robustness of my model, and provide some evidence that using the additional, incomplete Defendant data does not meaningfully alter the outcome of my analysis.

Figure 76. Direct Overcharge Model Results – Limited Defendant Data

	BACON			BELLY			FRESH HAM			LOIN			RIBS			SHOULDER		
Explanatory Variables [1]	Est	Se		Est	Se		Est	Se		Est	Se		Est	Se		Est	Se	
Competing Proteins Index							0.33	0.02	*	0.46	0.01	*	0.76	0.01	*	0.38	0.01	*
GDP	1.71	0.04	*	2.02	0.14	*	0.86	0.13	*	0.56	0.03	*	0.56	0.04	*	1.16	0.04	*
ISU Hog Cost	0.18	0.01	*	0.38	0.02	*	0.49	0.01	*	0.50	0.00	*	0.21	0.01	*	0.43	0.01	*
Agri Stats Plant Cost	0.20	0.01	*	0.17	0.03	*	1.04	0.03	*	0.51	0.01	*	0.66	0.01	*	0.51	0.01	*
Swine Flu Indicator	(0.13)	0.00	*	(0.16)	0.01	*	(0.00)	0.00		(0.02)	0.00	*	(0.05)	0.00	*	(0.07)	0.00	*
Consumer Price Index	(0.01)	0.00	*	(0.01)	0.00	*	(0.03)	0.00	*	(0.03)	0.00	*	(0.03)	0.00	*	(0.03)	0.00	*
Piglet Loss	1.10	0.01	*	0.80	0.05	*	3.14	0.05	*	1.49	0.02	*	0.51	0.02	*	2.99	0.03	*
January Indicator	-	-		-	-		-	-		-	-		-	-		-	-	
February Indicator	0.01	0.00	*	(0.01)	0.00	*	(0.03)	0.00	*	(0.00)	0.00	*	0.02	0.00	*	(0.03)	0.00	*
March Indicator	0.01	0.00	*	(0.00)	0.00		(0.04)	0.00	*	(0.00)	0.00	*	0.03	0.00	*	(0.01)	0.00	*
April Indicator	0.02	0.00	*	(0.01)	0.00	*	(0.03)	0.00	*	0.02	0.00	*	0.04	0.00	*	0.02	0.00	*
May Indicator	0.03	0.00	*	0.04	0.00	*	0.03	0.00	*	0.07	0.00	*	0.06	0.00	*	0.10	0.00	*
June Indicator	0.06	0.00	*	0.09	0.00	*	0.08	0.00	*	0.07	0.00	*	0.03	0.00	*	0.11	0.00	*
July Indicator	0.09	0.00	*	0.12	0.00	*	0.12	0.00	*	0.07	0.00	*	(0.01)	0.00	*	0.12	0.00	*
August Indicator	0.13	0.00	*	0.08	0.00	*	0.18	0.00	*	0.09	0.00	*	0.00	0.00	*	0.14	0.00	*
September Indicator	0.09	0.00	*	0.03	0.00	*	0.18	0.00	*	0.08	0.00	*	(0.02)	0.00	*	0.13	0.00	*
October Indicator	0.06	0.00	*	0.01	0.00	*	0.18	0.00	*	0.07	0.00	*	(0.01)	0.00	*	0.12	0.00	*
November Indicator	0.05	0.00	*	(0.02)	0.00	*	0.17	0.00	*	0.02	0.00	*	(0.00)	0.00	*	0.09	0.00	*
December Indicator	0.02	0.00	*	(0.03)	0.00	*	0.08	0.00	*	(0.00)	0.00	*	(0.01)	0.00	*	0.06	0.00	*
Jan 2009-Jun 2018 Period Indicator	0.17	0.00	*	0.23	0.01	*	0.06	0.01	*	0.05	0.00	*	0.08	0.00	*	0.11	0.00	*
Jan 2009-Jun 2018 Overcharge Rate [2]	16.0%			20.6%			6.2%			4.9%			7.9%			10.6%		
Jul 2018-Dec 2020 Period Indicator	0.13	0.00	*	0.19	0.01	*	(0.01)	0.01	*	0.01	0.00	*	0.08	0.00	*	0.05	0.00	*
Covid Indicator	0.06	0.00	*	(0.06)	0.01	*	(0.08)	0.01	*	0.16	0.00	*	0.01	0.00	*	0.07	0.00	*
Adjusted R^2	0.90			0.78			0.80			0.93			0.93			0.83		
Number of Observations	583,026			57,359			87,742			548,128			340,479			330,468		
Benchmark Period	*January 1, 2005 through December 31, 2008*																	
Conspiracy Period	*January 1, 2009 through June 30, 2018*																	
Class Period	*June 29, 2014 through June 30, 2018*																	

Notes:

Standard errors are calculated by using clusters of Defendant, product code and customer. * denotes statistical significance at p<0.05.

[1] Coefficient estimates for the constant and Defendant-product code-customer fixed effects are not reported.

[2] Each Period Overcharge Rate is calculated by the following formula that accounts for the semi-log functional form of the regression model:

$$1 - \frac{1}{exp^{(Period\ Indicator\ -0.5\times Var(Period\ Indicator))}}$$

[3] Number of observations reflect unique combinations of Defendant - product code - customer - month values.

249. I estimated two additional regression models. First, I estimated the overcharge using Defendants' data, but combined all cuts into a single model. This model still allows for seasonal variation between cuts, but estimates a single overcharge.[525] Second, I estimated the

[525] See backup production.

overcharge using public monthly wholesale pricing data from the USDA.[526] The results of both estimations are consistent with the cut-specific estimates run using Defendant data.

2. Applicability of Overcharge Results to Defendants with Missing Data

250. While I would prefer to conduct my overcharge analysis using sufficient benchmark data for each pork packer Defendant, that is not possible. As noted previously, there are major shortcomings in the benchmark period productions for JBS and Smithfield, and Clemens produced no benchmark data at all. It is my understanding that the agreed upon time for producing transactional data has passed. Should Smithfield, Clemens, or JBS ultimately produce additional benchmark data, I will evaluate it and update my conclusions appropriately.

251. Of course, just because a Defendant did not retain (or produce) records sufficient to assess antitrust impact does not mean that they did not charge supracompetitive prices. As shown previously in this report, Defendants' prices are closely related to each other. Further, evidence shows that Defendants a) used the same USDA and other market measures for pricing pork, b) used Agri Stats to identify pricing "opportunities" (i.e., instances where a packer's prices were lower than others'), and c) sold products that are highly substitutable to scores of overlapping customers—including each other.

252. As shown above, the overcharges estimated using only data from Defendants that produced data starting in 2005 are substantially the same as those using all data produced by Defendants. Further, when my model is applied to wholesale prices reported to the USDA, it shows an overcharge consistent with that estimated using Defendants' data.[527] All of these analyses and facts support the conclusion that the overcharges I have estimated can be reasonably and appropriately applied to all Defendants.

3. Implications of Regression Analysis for Common Impact

253. In previous sections of this report, I concluded that the alleged conspiracy would have affected all (or virtually all) customers. As my basis for this conclusion, I discussed how a) the pork products at issue are highly commoditized in nature; b) Defendants dominate the pork packing market; c) there were significant barriers to entry into the packing market; d) Defendants have

[526] See backup production.

[527] See backup production.

had, through numerous trade organizations and Agri Stats, opportunities to collude, monitor, and enforce the alleged conspiracy; e) pork prices are based on market values, which are tied to the available supply of pork, which would have necessarily been affected by the alleged conspiracy; and f) statistical analysis of Defendants' prices shows consistently high degrees of correlation across multiple relevant dimensions.

254. These factors described above are a sufficient basis to reach a conclusion that the impact from the alleged conspiracy would be common to all DPPs. The results of the regression analysis described above provide econometric evidence that the alleged conspiracy resulted in higher pork prices paid by DPPs and demonstrate a method for calculating damages on a Class-wide basis.

255. In support of my conclusion that the alleged conspiracy would have impacted all (or virtually all) customers, I conducted an additional statistical analysis using the regression model described above that includes all Defendant data. Specifically, I use an approach that compares the actual prices paid by each customer to the "but-for" prices predicted by the regression model. Using this method, "impact" for any individual customer is defined as paying on at least one occasion during the Class Period an *actual* price that is higher than the *but-for* price (wherein the estimated effects of the conspiracy are removed) predicted by my regression model. Because I estimated cut-specific overcharges, I perform this test and then remove duplicates (because most customers bought more than one type of cut).

256. Of the 4,550 customers in the regression data during the Class Period, 4,535 (over 99%) made at least one purchase at a price above the predicted but-for level.[528] In other words, according to my regression model, less than 1% of DPPs *never* paid a price that was higher than the predicted but-for price. It is further notable that this small group of customers have a very small amount of purchases—less than 0.001% of all relevant sales.[529] It is not my opinion that those customers whose predicted but-for prices were always below their actual prices were necessarily not impacted by the alleged conspiracy. Indeed, my analysis of the market,

[528] See backup production.

[529] See backup production.

products, and other information in this case all support the finding that each DPP would have been impacted.

VI. CALCULATION OF DAMAGES

A. Relevant Class Sales & Damages Calculation

257. Based on Defendants' transaction data, sales of Class Products during the period of June 29, 2014 through June 30, 2018 total $51,378,285,595.[530] Should Defendants produce more complete sales records, I could provide a more complete calculation of Class-wide sales. Alternatively, the missing portions of Defendants' sales could be reasonably estimated using a combination of existing data and information about Defendants' individual market shares.

258. Damages are found by applying the relevant overcharge to the relevant sales calculated above. The table below depicts damages to Class members during the Damages Period, which amount to just over $5 billion.

Figure 77. Direct Purchaser Class Damages Calculation[531]

Pork Category	Relevant Commerce	Overcharge	Damages
BACON	$ 11,211,337,777	13.9%	$ 1,559,359,334
BELLY	$ 5,213,895,412	19.1%	$ 996,551,036
FRESH HAM	$ 4,615,184,847	4.7%	$ 217,980,485
LOIN	$ 12,517,475,455	4.3%	$ 535,174,152
RIBS	$ 8,453,471,484	8.0%	$ 680,193,873
SHOULDER	$ 9,366,920,621	11.5%	$ 1,073,606,485
TOTAL	**$ 51,378,285,595**		**$ 5,062,865,365**

[530] This commerce estimate is based on the transactional sales data available to me. As noted previously, there are some apparent gaps in Defendant sales data (see **Figure 64** above).

[531] See backup production and **Figure 75**.

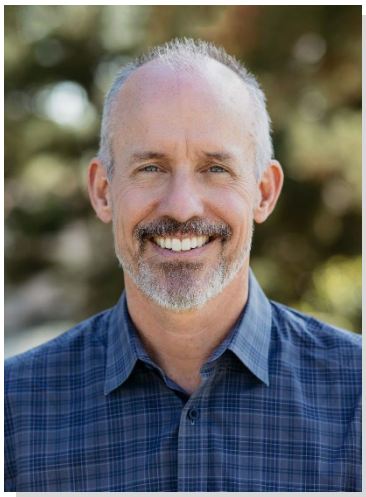
I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my knowledge and belief and that this report was executed in Irvine, California, this 2nd day of May 2022.

Russell W. Mangum III

Appendix A

CIRQUE ANALYTICS

RUSSELL W. MANGUM III



4 Park Plaza
Suite 1930
Irvine, CA 92614

T (949) 594-1601
mangum@cirqueanalytics.com

CURRENT POSITIONS

Executive Vice President, Cirque Analytics, LLC; 2021–present
Professor, Concordia Univ Irvine, Sch of Business and Economics; 2013–present

EDUCATION

Ph.D., economics, University of Southern California, 1995
M.A., economics, University of Southern California, 1992
B.A., economics (hons), Calif. State University, Fullerton, 1988

SPECIALIZED EXPERIENCE, RESEARCH, OR INTEREST

Antitrust; Commercial Disputes; Intellectual Property; Statistics and Econometrics, Valuation

PAST POSITIONS

2021	Visiting Researcher, Univ of Winchester, Sch of Bus, Law, and Tech	Winchester, UK
2007–2021	Sr. Vice President, Nathan Associates, Inc.	Irvine, CA
2002–2012	Associate Adjunct Professor, USC, Dept. of Economics	Los Angeles, CA
2001–2007	Vice President, Analysis Group, Inc.	Los Angeles, CA
2001	Manager, PricewaterhouseCoopers, Financial Advisory Svcs.	Los Angeles, CA
1998–2001	Managing Associate, Nathan Associates Inc.	Arlington, VA
1998–2000	Adjunct Professor, Johns Hopkins University, Krieger School	Washington, DC
1995–1998	Economist, U.S. Federal Trade Commission	Washington, DC

COURSES TAUGHT

- Principles of Micro/Macroeconomics, Interm. Micro/Macroeconomics, Managerial Economics, Statistics and Econometrics, Finance, Money and Financial Markets, Economics of Sin, Environmental Economics, Business Information Technology, Advanced Topics in Economics

EXPERIENCE SUMMARY

Dr. Mangum has over 25 years of experience in economic analysis, research, and teaching. His consulting practice centers on economic analysis and damages quantification in matters related to intellectual property and technology, antitrust, class certification, statistical analysis, and complex commercial disputes. Dr. Mangum's experience as an economic expert is extensive, with testimony in over 100 matters before local, state, and federal courts. Dr. Mangum has taught graduate and undergraduate courses in economics, statistics, finance, and econometrics. He is currently an Associate Professor of Economics in the School of Business and Economics at Concordia University Irvine, and has previously taught at Johns Hopkins University, The University of Southern California, and Pepperdine University. Dr. Mangum previously worked at Nathan Associates, Inc., PricewaterhouseCoopers, and The United States Federal Trade Commission, Bureau of Economics.

PROFESSIONAL EXPERIENCE

Intellectual Property

Dr. Mangum has substantial experience in the area of intellectual property damages, including claims related to infringement of patents; FRAND licensing commitments; patent pools; copyrights; and trademarks; as well as theft of trade secrets; false designation of origin; and false advertising. The case contexts in which Dr. Mangum has performed these analyses include:

- Patent infringement related to:
  - Computer, electronics, and telecommunication industry:
    - Cellular communication network technology;
    - Modem communication devices;
    - Wireless communication network devices (routers, cards, including under FRAND licensing commitments);
    - Handheld device navigation applications;
    - NIC hardware and chipsets;
    - Semiconductors;
    - Webswitching and IP router network hardware;
    - Wired and wireless portable electronic temperature sensor devices;
    - Electronic eReader devices;
    - Digital TV Tuners under FRAND licensing commitments;
    - Automated lip-sync animation used in video games;
    - Data encryption devices.
    - VoIP network telephony services.
  - Medical devices:
    - Artificial vertebral disc implants;
    - Trocar seals for laparoscopic surgery;
    - Spinal fusion implants;
    - Breast biopsy devices;
    - Remote medical information monitoring technology.
  - Energy
    - Specialized valves used in oil refining;
    - Electric utility management systems;
    - Wide-area real time phasor measurement and monitoring.
  - Food and agriculture:
    - Additive-infused candy;
    - Nutritional supplements;
    - New variety of late ripening white grapes;

- Structures and methods utilized in the growing of grapes and raisins.

- Business software
  - eProcurement;
  - Business intelligence;
  - Design and simulation;
  - Call routing software;
  - Computer tracking;
  - Program and application management;
- Clothing and clothing design
  - Padded athletic shirts/pants; shoes; headwear; accessories;
- Miscellaneous
  - Electronic nicotine delivery systems (NDS)
  - Personal watercraft devices and accessories
  - Consumer advertising design via use of digital media
  - Automated stapling machines used in bed manufacturing
  - Specialized hardware and control systems used in high-rise elevators
  - Electronic exchange systems for trading of commodities futures contracts
  - Electronic data management system used in public transportation projects
  - Document and print inspection systems

- Trademark, trade dress, or copyright infringement related to:
  - Sponsorship with motorsports, automotive repair tools and devices, beverages and snacks, and apparel;
  - Real estate property acquisition services;
  - Online dining reservation and payment services;
  - Internet search engine terms related to retail sales of food and arranged food products;
  - Enterprise Resource Planning (ERP) software;
  - Veterinary Teleradiology (online/internet) Services;
  - Devices and software for online mobile device data extraction and IT network devices;
  - Clothing, shoes, and jewelry;
  - Advertising and marketing through wireless mobile communications;
  - Motion picture trademarks in the manufacture of clothing;
  - Furniture products (mechanized and non-mechanized);
  - Portable combustion engines;
  - Infant care products;
  - Homeopathic products;

- Postal measuring products;
- Scented candle products;
- Children's toys;
- Art and art exhibits
- Design plans for a theme amusement park.

- Theft of trade secrets related to:
  - Cold extraction coffee processes
  - Electronic mechanisms for payment processing;
  - Technical documents, Product features, customer data, and marketing methods/models related to Systems for General Floor Hospital Monitoring of patient vital statistics;
  - Training methods, pricing models, and customer status databases related to Enterprise Resource Planning (ERP) software;
  - Customer data and information, and pricing models related to employee pension and benefits insurance brokerage services;
  - Government contracted research into laser vibrometry;
  - Devices and software for mobile device data extraction;
  - IT system design and implementation for the US defense industry;
  - Electronic engineering and CAD packages used in US naval warcraft architecture;
  - Methods for mathematical simulations for the pricing of mortgage backed securities;
  - Soy coffee alternative products;
  - Design, development, marketing, and manufacturing of toys;
  - Computer game accessories.
- False advertising, false designation of origin, or unauthorized use of likeness related to:
  - Chemical dependence treatment services;
  - Real estate property acquisition services;
  - Security monitoring systems and services;
  - Consumer appliances;
  - High Availability Disaster Recovery (HA/DR) business software;
  - Medical data printer systems;
  - Furniture products;
  - Composed music and lyrics used in television commercials;
  - Restaurant meals and shopping services;
  - Internet advertising services via advertorial placement on publishers' websites;
  - Nutritional supplements and beverages.
- Inventorship disputes related to:
  - Cold extraction coffee processes

- Spinal fusion implant systems;
- Interarterial guidewire and embolic filter devices.

Competition/Antitrust

Dr. Mangum has substantial experience in the area of competition and antitrust, including analyses of relevant product and geographic markets, market power, monopolization, and likelihood of monopolization from impending events. These analyses usually include statistical and econometric analysis of market data to identify the extent of competition, and the magnitude of competition. The case contexts in which Dr. Mangum has performed these analyses include:

- Evaluated common impact and estimated damages, for direct and indirect purchasers, from price fixing and other conspiracies in the markets for commercial tissue paper, bulk vitamins, high-end automobiles, ready mix concrete, consumer apparel, Korean noodles, packaged seafood, meat products, interior molded doors, airline travel, and pharmaceuticals.
- Evaluation of alleged competitive foreclosure in the market for sleep apnea products, including relevant markets, market power, and lost profits damages.
- Evaluation of alleged price discrimination across dealers of hardscape building materials.
- Evaluation of antitrust claims and affirmative defenses of patent misuse related to required terms in patent license programs for flash memory semiconductors and systems.
- Evaluation of market segments, market channels, and cost pass-through in the market for DRAM-containing products and NFL brand apparel.
- Estimation of damages related to:
  - A conspiracy to boycott developments in DRAM packaging;
  - Foreclosure of competition in market for footwear insoles and inserts.
- Evaluation of competitive effects of exclusive dealing clause in a franchise agreement.
- Evaluated the competitive effects of exclusive dealing policies regarding:
  - Acute care hospital and physician services;
  - Customer purchase data exchange related to direct mail advertising and sales;
  - Free standing insert advertising (coupon) services;
  - Replacement parts for 3-piece body welder systems;
  - Interconnect agreements between internet backbone communication services;
  - Supply of biological inputs used in creating generic biologic therapeutic treatments;
  - Professional sports branded athletic apparel;
  - Durable medical equipment;
  - Pharmaceuticals.
- Analyzed the competitive effects from wrongful patent application and issuance (fraud on the patent office) related to processes and mechanisms for food preparation and processing.
- Analyzed the likely competitive effects of proposed mergers in various industries, including hospital services, physician services, pharmaceuticals, medical insurance, construction aggregates, supermarkets, auto parts, cable systems and programming, industrial refractories, and computer game software.

Commercial Disputes

- Evaluated damages related to alleged breach of contract involving collection and retention of personalized information connected to web browsing activity.
- Evaluated damages related to alleged breach of contract involving online storage agreements.
- Evaluated claims of damages related to attempted sale of cold extraction coffee company and the discovery of patents allegedly based on confidential information.
- Evaluated claims of damages related to failure to close a sale for multiple solar energy production properties/companies.
- Estimated damages in the form of lost profits from breach of contract in a services joint venture involving use of indexes and associated data for creation and analysis of international financial securitized and derivatives.
- Estimated damages in the form of disgorgement and lost company value related to brokerage services involving employee pension and benefit programs.
- Evaluated claims of replacement cost and lost profits damages related to alleged interference in the market for femtocell wireless communication products.
- Evaluated claims of damages in the form of lost profits and disgorgement of compensation and benefit from alleged unauthorized use of confidential materials in the market for government contracts for research into laser vibrometry.
- Estimated damages from employee theft of HDD computer memory products from s research/testing facility. Calculated value based on historical in-channel market price and on historical costs of manufacturing and sales.
- Evaluated claims of lost profits damages arising from alleged professional malpractice related to commercial development and land use.
- Provided statistical and data analysis of invoices for disaster recovery and construction services. Estimated lost profits related to alleged fraud, breach of contract, and tortious interference.
- Estimated damages related to alleged breaches of contract, including:
  - Contract involving the development and sale of solar power generation projects;
  - Contract involving the supply of active ingredients in nutriceuticals;
  - Non-solicitation agreement between government defense contracting companies;
  - Contract for concession services at amusement parks;
  - Contract for creation and promotion of credit reporting services;
  - Contract for supply of MLB jerseys used in creation of sports memorabilia;
  - Contract for blending and supply contracts for specialized non-dairy beverages;
  - Non-compete clauses (restaurant lease, franchising, structural steel fabrication);
  - Contract for earning and redeeming of frequent flyer miles;
  - Contract for purchase of television airtime on a local over-the-air station;
  - Contract for representation and sale of television programming;
  - Royalty contract regarding design and functionality elements use in toys;
  - Contract for technology and support from software conference bridge systems;

  - Contract for conference calling services and long distance calls connection services.
- Estimated damages from defamation related to the launch of a clinic for medical disorders.
- Evaluated claims by the CA Coastal Commission related to lost recreational value from proposed coastal bluff seawall construction.
- Evaluated concepts and methods for calculating proceeds from a Qi Tam suit related to improper medical lab billing practices.
- Estimated damages related to Quantum Meruit claims involving use of software to manage viewing and storage of electronic medical images.

Employment and Labor

- Estimated damages related to lost profits; lost company value, employee training and hiring expense, and/or disgorgement of defendant's profits in multiple cases related to the alleged breach of non-solicitation agreements and unauthorized use of confidential information by departing employees the insurance and MLM health and wellness industries.
- Estimated lost profits damages and/or disgorgement of defendant's profits in multiple cases related to the alleged breach of non-solicitation agreements and unauthorized use of confidential information involving government defense contracting companies.
- Estimated plaintiff's lost profits and disgorgement of defendant's profits related to the theft of trade secrets by departing employees in the automated emergency/disaster response industry.
- Estimated disgorgement of defendant's profits related to the theft of trade secrets by departing employees in the naval engineering industry.
- Provided statistical analysis of employee time card and pay data to estimate instances of underpayment or missed breaks.
- Estimated lost earnings and compensation damages related to an alleged wrongful termination of an employee; evaluated lost wages/earnings, lost retirement benefits, and lost compensation through stock options.
- Estimated damages to an employee/inventor related to exclusion as an inventor from PCT applications following termination from a start-up medical devices company; evaluated the plaintiff's claims of lost share of proceeds from technology share.

Statistical and Econometric Analysis

- Performed regression analysis to evaluate class-wide damages related to class certification in the context of alleged conspiracy on the prices of interior molded doors.
- Performed regression analysis to evaluate class-wide damages related to class certification in the context of alleged conspiracy on the prices of packaged seafood.
- Performed regression analysis to evaluate class-wide damages related to class certification in the context of alleged conspiracy on the prices of transatlantic air travel.
- Performed regression analysis to evaluate class-wide damages related to class certification in the context of alleged conspiracy on the prices of Korean noodle products.
- Evaluated regression and statistical analysis offered in support of damages related to an alleged breach of non-solicitation agreements and unauthorized use of confidential information by departing employees the insurance and MLM health and wellness industries.

- Evaluated regression and statistical analysis offered in support of damages and common impact in an indirect purchaser class action related to alleged false advertising for nutritional supplement beverages.
- Performed regression analysis to evaluate class-wide damages related to class certification in the context of alleged conspiracy and exclusive agreement between professional sports teams and an apparel manufacture.
- Performed regression analysis to estimate class-wide damages related to class certification in the context of alleged price fixing in markets for ready mix concrete.
- Performed regression analysis to estimate pass-through of anticompetitive price increases in the manufacturing and sale of DRAM and DRAM containing devices.
- Provided statistical analysis of employee time card and pay data to estimate instances of underpayment or missed breaks.
- Provided sampling techniques and statistical analysis of customer service database to estimate the extent of use of an allegedly infringing feature in a commercial router.
- Evaluated sampling techniques and extrapolation estimates related to allegedly improper medical billing practices and in the context of damages related to construction defects.
- Provided statistical and econometric analysis of survivorship related to consumer membership attrition in credit reporting programs.
- Provided statistical and econometric analysis of the correlation between purchase of infringing products and consequential purchase of related services.
- Provided statistical analysis and estimate of medical product sales in the absence of data from third party sales force.
- Provided statistical and econometric analysis of conference calling minutes related to alleged intentional interference and unfair competition.
- Conducted statistical analysis of incremental costs in support of lost profits calculations.

EXPERT WITNESS EXPERIENCE (SINCE 2017)

- *Lauren Adele Oliver v. Meow Wolf Inc., et al.,* United States District Court for the District of New Mexico (2022). Provided deposition testimony on behalf of plaintiff involving damages related to alleged copyright infringement involving art and art exhibits.

- *Sprint Communications Company LP v. Cequel Communications, LLC, et al.*, United States District Court, District of Delaware (2020). Testified at a bench trial (evidentiary hearing), and in deposition on behalf of plaintiff related to lost profits and royalty damages from alleged patent infringement involving VoIP telephony network services.

- *In Re Broiler Chicken Antitrust Litigation,* United States District Court, Northern District of Illinois (2022). Provided deposition testimony on behalf of plaintiffs related to the economic effects of an alleged conspiracy to constrain capacity in the broiler chicken industry.

- *VRtoysone, LLC, et al v. Disney Interactive Studios, Inc.,* United States District Court, Central District of California, Western Division (2022). Submitted an expert report on behalf of Defendant involving damages related to alleged patent infringement involving video games.

- *Patrick Calhoun, et al. v. Google LLC,* United States District Court, Northern District of California (2021). Submitted an expert report on behalf of plaintiff class involving damages and common impact related to alleged breach of contract involving the collection and retention of personalized information connected to web browsing activity.

- *CPI Security Systems Inc. v. Vivint Smart Home Inc. et al.,* United States District Court, Western District of North Carolina, Charlotte Division (2021). Provided deposition testimony on behalf of plaintiff involving unjust enrichment and royalty damages related to alleged false advertising and unfair competition related to security monitoring systems and services.

- *Martifer-Silverado Fund I, LLC and Silverado Power LLC v. Talesun Solar USA, Ltd.,* Superior Court of California, San Francisco County (2021). Provided trial and deposition testimony on behalf of Defendant, related to alleged breach of contract involving solar energy projects.

- *Javo Beverage Co., Inc., v. Stephen Corey,* American Arbitration Association (2021). Provided trial (arbitration) and deposition testimony on behalf of respondent related to breach of contract and misappropriation of confidential information and technology in the market for coffee extracts.

- *Andrea Williams and James Stewart (class reps) v. Apple Inc.*, United States District Court, Northern District of California (2021). Submitted an expert report on behalf of plaintiffs related to damages involving alleged breach of contract regarding provision of electronic file storage.

- *QC Manufacturing, Inc., v. Solatube International, Inc. and Brighter Concepts, Inc. dba Solatube Home Daylight,* JAMS Arbitration, Los Angeles, CA (2020). Provided trial (arbitration) testimony on behalf of complainant related to a breach of contract (litigation settlement agreement) involving whole house fans.

- *In Re Domestic Airline Travel Antitrust Litigation,* United States District Court, District of Columbia (2020). Provided deposition testimony on behalf of plaintiff class related to the economic effects of an alleged conspiracy to constrain capacity in the domestic airline travel industry.

- *RV Skincare Brands LLC v. Digby investments Ltd.., Quickbox LLC, et al.,* United States District Court, Southern District of New York (2020). Submitted an expert report on behalf of certain defendant related to damages from alleged counterfeit sales and trademark infringement involving fulfillment of skincare product commerce.

- *Cisco Systems Inc. et al. v. Zahid Hassan Sheikh et al.*, United States District Court, Northern District of California (2020). Provided deposition testimony on behalf of certain defendants related to damages from alleged counterfeit sales and trademark infringement involving transceiver and switching IT network equipment.

- *San Diego Country Credit Union v. Citizens Equity First Credit Union*, United States District Court, Southern District of California (2020). Provided deposition testimony on behalf of plaintiff related to damages flowing from fraudulent declaration in the registration of a trademark involving credit unions.

- *Sprint Communications Company LP v. Atlantic Broadband Finance LLC, et al.*, United States District Court, District of Delaware (2020). Provided deposition testimony on behalf of plaintiff related to lost profits royalty damages from alleged patent infringement involving VoIP telephony network services.

- *Sprint Communications Company LP v. Charter Communications Inc. et al.*, United States District Court, District of Delaware (2020). Provided deposition testimony on behalf of plaintiff related to lost profits and royalty damages from alleged patent infringement involving VoIP telephony network services.

- *Sprint Communications Company LP v. Mediacom Communications Corp.*, United States District Court, District of Delaware (2020). Provided deposition testimony on behalf of plaintiff related to lost profits and royalty damages from alleged patent infringement involving VoIP telephony network services.

- *Sprint Communications Company LP v. TPC Global LLC et al.*, United States District Court, District of Delaware (2020). Provided deposition testimony on behalf of plaintiff related to lost profits and royalty damages from alleged patent infringement involving VoIP telephony network services.

- *Sprint Communications Company LP v. Wideopenwest Inc. et al.*, United States District Court, District of Delaware (2020). Provided deposition testimony on behalf of plaintiff related to lost profits and royalty damages from alleged patent infringement involving VoIP telephony network services.

- *S&P Dow Jones Indices LLC and SPDJ Singapore Pte Ltd. v. BSE Ltd.,* United States District Court, Northern District of California (2020). Provided trial (tribunal) testimony on behalf of claimants and counterrespondants for an arbitration concerning damages from breach of contract in a service joint venture related to the use of indexes and associated data for creation and analysis of international financial securitized and derivatives.

- *In Re: Molded Doors Indirect Purchaser Antitrust Litigation*, United States District Court, Eastern District of Virginia, Richmond Division (2020). Provided deposition testimony related to class certification and the merits phase of an antitrust case on behalf of an indirect purchaser plaintiff class related to the evaluation of common impact, pass-through, and class wide damages involving alleged collusion on the prices for interior molded doors.

- *Citcon USA LLC v. Riverpay Inc. et al.,* United States District Court, Northern District of California (2019). Provided trial and deposition testimony on behalf of defendant/counterplaintiff concerning damages from alleged tortious interference and breach of contract involving electronic payment processing network services.

- *3G Licensing, et al., v. Lenovo Group Ltd., et al.,* United States District Court, District of Delaware (2019). Submitted an expert report on behalf of defendants Lenovo and Motorola Mobility related to reasonable royalty damages for patent infringement involving cellular phone network technologies.

- *Inteliquent, Inc. v. Free Conferencing Corporation, et al.,* United States District Court, Northern District of Illinois, Eastern Division (2019). Provided deposition testimony on behalf of Counterclaim Plaintiffs, related to alleged breach of contract, intentional interference, and unfair competition involving conference calling services and long-distance calls connection network services.

- *In Re: Packaged Seafood Products Litigation*, United States District Court, Southern District of California (2019). Provided deposition testimony related to the merits phase of the case and also testified at a bench trial (evidentiary hearing) on behalf of direct purchaser plaintiff class related to class certification and estimation of class wide damages in an antitrust case involving alleged collusion on the prices for packaged seafood. Also issued initial and reply reports regarding class certification and initial and reply reports related to antitrust effects and damages.

- *T.R.P. Company, Inc., v. Similasan AG and Similasan Corporation,* United States District Court, District of Nevada (2019). Provided deposition testimony on behalf of plaintiff/counter-defendant involving unjust enrichment and lost profits related to trademark infringement of certain homeopathic products.

- *Advanced Digital Solutions International, Inc., v. Rahi Systems, Inc., et al.,* Superior Court for the State of California, County of Alameda (2019). Provided deposition testimony on behalf of plaintiff concerning disgorgement damages related to trade secret misappropriation involving the theft of customer lists.

- *ADT LLC and ADT* US *Holdings v. Alder Holdings LLC, et al.,* United States District Court, Southern District of Florida, Palm Beach Division (2019). Provided trial and deposition testimony on behalf of plaintiff involving unjust enrichment and royalty damages related to alleged false advertising and unfair competition, and contempt of injunction related to security monitoring systems and services.

- *ADT LLC v. Security Networks LLC et al.,* United States District Court, Southern District of Florida, Palm Beach Division (2019). Submitted an expert report on behalf of plaintiff involving unjust enrichment and royalty damages related to alleged false advertising and unfair competition, and contempt of injunction related to security monitoring systems and services.

- *ADT LLC & ADT US Holdings, Inc. v. Northstart Alarm Services LLC et al.,* United States District Court, Southern District of Florida (2019). Submitted an expert report on behalf of plaintiff involving unjust enrichment and royalty damages related to alleged false advertising and unfair competition, and contempt of injunction related to security monitoring systems and services.

- *Grasshopper House LLC. V. Clean & Sober Medua LLC., et al.*, and *Cliffside Malibu, et al. v. Grasshopper House LLC, et al.* United States District Court, Central District of California, Western Division (2019). Provided trial and deposition testimony on behalf of counterclaim plaintiffs involving damages from alleged false advertising related to treatment services for chemical dependence.

- *In Re Korean Ramen Antitrust Litigation,* United States District Court, Northern District of California, San Francisco Division (2018). Provided trial and deposition testimony on behalf of a class of purchasers of Korean Noodles related to damages from an alleged antitrust price fixing conspiracy.

- *Monster Energy Company v. Integradted Supply Network LLC*, United States District Court, Central District of California (2018). Provided trial testimony on behalf of plaintiff related to damages from alleged trademark and trade dress infringement involving beverages and snacks, tools, and clothing, motorsports and sponsorship and promotion.

- *Soteria Encryption LLC v. Apricorn Inc., et al.,* United States District Court, Central District of California, Western Division (2018). Submitted an expert report on behalf of defendants Apricorn and Lenovo related to reasonable royalty damages for patent infringement involving data encryption network devices.

- *McRO Inc. v. Bandai Nameco Games America Inc., et al.*, United States District Court, Central District of California, Western Division (2018). Provided deposition testimony on behalf of certain defendants related to damages from alleged patent infringement involving automated lip-sync animation used in video games.

- *In Re: Transpacific Passenger Air Transportation Antitrust Litigation*, United States District Court, Northern District of California San Francisco Division (2018). Provided deposition testimony on behalf of direct purchaser plaintiff class related to class certification and estimation of class wide damages in an antitrust case involving alleged collusion on the prices for transatlantic air travel.

- *Express Homebuyers USA, LLC, v. WBH Marketing Inc.*, United States District Court, Eastern District of Virginia, Alexandria Division (2018). Provided deposition testimony on behalf of defendant/counterplaintiff related to damages from alleged trademark infringement and trade libel involving real estate property acquisition services.

RESEARCH PAPERS AND PUBLICATIONS

- "FRAND Commitments and Royalties for Standard Essential Patents", with S. Bosworth and E. Matolo, in Complications and Quandaries in the ICT Sector, Bharadwaj, Gupta, and Devaiah eds., Ch. 2, Springer Open, ISBN 978-981-10-449570, 2018.
- "Corrective Advertising in Lanham Act Damages: The Use and Misuse of Past Advertising Expenditures" with S. Bosworth and E. Matolo, *The Trademark Reporter*, May-June Volume, 2017.
- "The Case for Admitting Settlement License Agreements in a Reasonable Royalty Analysis," with S. Conroy and R. Knudsen, 2011, *Les Nouvelles,* Volume XLVI No. 4, 2012.
- "Cost Analysis," with J. Kinrich and A. Meister, in Intellectual Property Damages, Guidelines and Analysis, 2004 supplement, M. Glick, L. Reymann, and R. Hoffman, eds., Chapter 14a, Wiley: New York.
- "Analysis and Measurement of Damages in Patent Infringement Actions," with J. Kinrich, 2003, proceedings of Practicing Law Institute.

PAST OR PRESENT AWARDS, PROFESSIONAL MEMBERSHIPS

Outstanding Antitrust Litigation Achievement in Economics, American Antitrust Institute, 2019

American Antitrust Institute, advisory board member

American Bar Association, member

American Economic Association, member

Licensing Executives Society, member, chapter chair

Los Angeles County Bar Association, member

Los Angeles Intellectual Property Law Association, member

Orange County Bar Association, member

Orange County Patent Law Association, member

Appendix B

Appendix B: Materials Relied Upon

Legal Materials

- Amended Memorandum and Opinion and Order, Oct. 20, 2020 (Doc. 520)
- Direct Purchaser Plaintiffs' Third Amended and Consolidated Class Action Complaint, Jan. 15, 2020
- Email from Brian Robison, Gibson Dunn, to Michael Moskovitz and others, "RE: Pork - Smithfield's Structured Data Production," May 25, 2021
- Letter from Brian Robison, Gibson Dunn, to All Plaintiffs' Counsel, "Re: *In re Pork Antitrust Litig.,* Civil Action Nos. 0:18-cv-01776-JRT-HB (D. Minn.), 0:19-cv-01578-JRT-HB (D. Minn.), 0:19-cv-02723-JRT-HB (D. Minn.)," Sept. 17, 2021
- Letter from Joshua Lipton, Gibson Dunn, to Bobby Pouya, Pearson Simon Warshaw, "Re: *In Re Pork Antitrust Litigation* - Smithfield and Smithfield Legacy Data," Nov. 3, 2021
- Letter from Liam Phibbs, Hogan Lovells, to Shana Scarlett, Hagens Berman Sobol Shapiro, "Re: *In Re Pork Antitrust Litigation* (Civil Action No. 0:18-cv-01776-JRT-HB)," Dec. 15, 2021 (and attachment AGRI-STATS_AGRICODE.PDF)
- Memorandum and Order, Oct. 16, 2020 (Doc. 519)

Depositions and Exhibits

- Deposition of Cory Bollum, Dec. 1, 2021
- Deposition of Damon Ginther, Dec. 7, 2021
- Deposition of Daniel Groff, Dec. 15, 2021
- Deposition of Joshua Rennells, Feb. 24, 2022
- Deposition of Mark Copa, Jan. 27, 2022
- Deposition of Melvin Davis, Dec. 16, 2021
- Deposition of Paul Peil, Dec. 9, 2021
- Deposition of Robert Moore, Dec. 21, 2021

Publicly Available

- ABA Section of Antitrust Law, *Econometrics: Legal, Practical, and Technical Issues,* 2nd ed. (Chicago, IL: ABA Publishing, 2014)
- Agri Stats, "Partnership And Services," accessed Feb. 14, 2022, https://www.agristats.com/partnership
- Amanda Cauffman et al., "How much meat should a hog yield?" *University of Wisconsin, Madison,* accessed Aug. 2, 2021, https://livestock.extension.wisc.edu/articles/how-much-meat-should-a-hog-yield/
- American Meat Science Association, "Pork Production: Farrow to Finish Process," Mar. 9, 2017, https://meatscience.org/TheMeatWeEat/topics/fresh-meat/article/2017/03/09/pork-production-farrow-to-finish-process
- Andreas Kruck et al., "What Went Wrong? The World Health Organization from Swine Flu to Ebola," *National Library of Medicine,* Oct. 9, 2017, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7122988/
- Associated Press, "Swift sold to Brazilian firm," *Denver Post,* July 12, 2007, https://www.denverpost.com/2007/07/12/swift-sold-to-brazilian-firm/
- Austin Daily Herald "Pork Producers Hear from Packers," *Austin Daily Herald,* July 17, 2000, https://www.austindailyherald.com/2000/07/pork-producers-hear-from-packers/

Appendix B: Materials Relied Upon

- Betsy Freese, "Pork Powerhouses 2008," *Successful Farming,* 2008, *available at* https://www.agriculture.com/system/files/PorkPowerhouses_2008_0.pdf
- Betsy Freese, "2004 Pork Powerhouses," *Successful Farming,* 2004, *available at* https://www.agriculture.com/system/files/PorkPowerhouses_2004_0.pdf
- Betsy Freese, "2009 Pork Powerhouses," *Successful Farming,* 2009, *available at* https://www.agriculture.com/system/files/Pork%20Powerhouses%202009.pdf
- Betsy Freese, "Pork Powerhouses 2007: Run-Up in Rations," *Successful Farming,* Oct. 3, 2007, *available at* https://www.agriculture.com/livestock/hogs/Pork-Powerhouses-2007_283-ar3178
- Betsy Freese, "Pork Powerhouses 2008: The Big Squeeze," *Successful Farming,* Sept. 4, 2008, *available at* https://www.agriculture.com/livestock/hogs/The-big-squeeze-Pork-Powerhouses-2008_283-ar4443
- Betsy Freese, "Pork Powerhouses 2009: Big Boys Cut Back," *Successful Farming,* Sept. 14, 2009, *available at* https://www.agriculture.com/livestock/hogs/pk-powerhouses-2009-big-boys-cut-back_283-ar5700
- Betsy Freese, "Pork Powerhouses 2013: Disease Hits, Growth Continues," *Successful Farming,* Sept. 30, 2013, *available at* https://www.agriculture.com/livestock/hogs/pk-powerhouses-2013-disease-hits-growth_283-ar34203
- Betsy Freese, "Power Powerhouses 2004: Pigs, Pigs, and More Pigs," *Successful Farming,* Oct. 1, 2004, *available at* https://www.agriculture.com/livestock/pork-powerhouses/pork-powerhouses-2004-pigs-pigs-and-more-pigs
- CDC, "What People Who Raise Pigs Need To Know About Influenza (Flu)," Aug. 19, 2014, accessed Apr. 19, 2022, https://www.cdc.gov/flu/swineflu/people-raise-pigs-flu.htm
- Christensen Farms, "About Us", accessed Apr. 9, 2022, https://www.christensenfarms.com/about-us/
- Christopher Davis and Biing-Hwan Lin, "Factors Affecting U.S. Pork Consumption," USDA, May 2005, https://www.ers.usda.gov/webdocs/outlooks/37377/15778_ldpm13001_1_.pdf?v=1036.8
- Clemens Food Group, "Vertically Coordinated," accessed Mar 29, 2022, https://clemensfoodgroup.com/our-company/vertically-coordinated
- CRS, "Potential Farm Sector Effects of 2009 H1N1 'Swine Flu': Questions and Answers," Congressional Research Service, Jan. 12, 2010, https://crsreports.congress.gov/product/pdf/R/R40575/11
- Dale Miller, "Industry's Stimulus Package - Cull Sows," *National Hog Farmer,* Mar. 15, 2009, https://www.nationalhogfarmer.com/marketing/0315-industrys-stimulus-package
- Damodar Gujarati, *Basic Econometrics,* 4th ed. (New York, NY: McGraw Hill, 2003)
- Daniel Rubinfeld, "Antitrust Damages," in *Research Handbook on the Economics of Antitrust Law,* ed. Einer Elhauge, 2009
- Daniel Rubinfeld, "Reference Guide on Multiple Regression," in *Reference Manual on Scientific Evidence,* 3rd ed., 2011
- David Barboza, "Goliath of the Hog World; Fast Rise of Smithfield Foods Makes Regulators Wary," *New York Times,* Apr 7. 2000, https://www.nytimes.com/2000/04/07/business/goliath-of-the-hog-world-fast-rise-of-smithfield-foods-makes-regulators-wary.html
- David H. Kaye and David A. Freedman, "Reference Guide on Statistics," in *Reference Manual on Scientific Evidence,* 3rd ed., 2011
- Dennis Carlton and Jeffrey Perloff, *Modern Industrial Organization,* 4th ed. (Chicago, IL: Addison Wesley, 2005)

Appendix B: Materials Relied Upon

- Dustin Baker, "Understanding USDA cutout reports," *National Hog Farmer,* Mar. 2, 2020, https://www.nationalhogfarmer.com/marketing/understanding-usda-cutout-reports
- Elzio Barreto, "Brazil's JBS-Friboi to buy Swift for $225 mln," *Reuters,* May 29, 2007, https://www.reuters.com/article/us-swift-friboi/brazils-jbs-friboi-to-buy-swift-for-225-mln-idUSN2930167420070529
- EMI, "About Us," accessed Dec. 30, 2021, https://www.expressmarketsinc.com/aboutus
- Food and Agriculture Organization of the United Nations, "Sources of Meat," Nov. 25, 2014, accessed Dec. 30, 2021, http://www.fao.org/ag/againfo/themes/en/meat/backgr_sources.html
- Food Processing Technology, "Prestage Foods' Pork Processing Plant, Mason, City, Iowa, US," *Food Processing Technology,* https://www.foodprocessing-technology.com/projects/prestage-foods-pork-processing-plant-mason-city-iowa
- Forbes, "Smithfield Foods," *Forbes,* accessed Dec. 22, 2021, https://www.forbes.com/companies/smithfield-foods/?sh=28fbe0281a8b
- Gretchen Vander Wal, "Real Cost of Small Plant Estimated at $33.6M," *National Hog Farmer,* Feb. 15, 2001, https://www.nationalhogfarmer.com/mag/farming_real_cost_small
- Hatfield, "Our Family," accessed Dec. 22, 2021, https://simplyhatfield.com/our-family
- Hatfield, "Our Pledge," accessed Dec. 22, 2021, https://simplyhatfield.com/our-pledge
- Hormel, "Citizenship Overview 2006," *available at* https://www.hormelfoods.com/wp-content/uploads/Citizenship_Overview.pdf
- Indiana Packers Corporation "Our Beloved Brands," accessed Dec. 23, 2021, https://indianapackerscorp.com/company/brands/
- Indiana Packers Corporation, "Message from the President," accessed Dec. 23, 2021, https://indianapackerscorp.com/company/message-from-president/
- International Center for Food Industry Excellence, "Pork Harvest Process," *available at* https://www.depts.ttu.edu/icfie/upcoming_events/ICFIE_pork_harvest.pdf
- Iowa State University, "Porcine Epidemic Diarrhea," Iowa State University, accessed Apr. 19, 2022, https://vetmed.iastate.edu/vdpam/FSVD/swine/index-diseases/porcine-epidemic-diarrhea
- J. Deyoung, "Pork packing capacity faces delays to growth," *Iowa Farmer Today,* June 15, 2018, https://www.agupdate.com/iowafarmertoday/news/livestock/pork-packing-capacity-faces-delays-to-growth/article_f86fde7e-64dc-11e8-b288-475ac8083072.html
- JBS, "History," accessed Feb. 9, 2022, https://ri.jbs.com.br/en/jbs/history/
- JBS, "International Conference Call JBS 4th Quarter 2009 Earnings Release," Mar. 8, 2010
- JBS, "Our Brands," accessed Dec. 30, 2021, https://jbsfoodsgroup.com/our-brands.
- JBS, "Our Business," accessed Dec. 30, 2021, https://jbsfoodsgroup.com/our-business.
- JBS, "Our Locations," accessed Feb. 15, 2022, https://jbsfoodsgroup.com/locations/united-states
- JBS, "Pork Suppliers," accessed Apr. 11, 2022, https://sustainability.jbsfoodsgroup.com/chapters/suppliers/pork-suppliers/
- Jim Long, "Jim Long Pork Commentary: National Pork Industry Conference (NPIC)," *The Pig Site,* July 17, 2019, https://www.thepigsite.com/news/2019/07/jim-long-pork-commentary-national-pork-industry-conference-npic
- Jodi Sterle, "The Facts about Paylean: Ractopamine for Swine," *Texas A&M University,* http://animalscience.tamu.edu/wp-content/uploads/sites/14/2012/04/ASWeb-093-TheFactsaboutpayleanractopamineforswine.pdf

Appendix B: Materials Relied Upon

- Joe Vansickle, "Smithfield Postpones Sow Stall Phaseout," *National Hog Farmer,* July 15, 2009, *available at* https://www.nationalhogfarmer.com/genetics-reproduction/sow-gilt/0715-smithfield-postpones-phaseout
- Joel Haggard, "China: Hot Summer, Olympics, Slow Pork Consumption Amid Industry Expansion," U.S. Meat Export Federation, Aug. 13, 2008, https://www.usmef.org/news-statistics/press-releases/china-hot-summer-olympics-slow-pork-consumption-amid-industry-expansion-14473/
- John Giamalva, "Pork and Swine: Industry & Trade Summary." United States ITC, Oct. 2014, https://www.usitc.gov/publications/332/pork_and_swine_summary_its_11.pdf
- Jonathan Baker and Daniel Rubinfeld, "Empirical Methods in Antitrust Litigation: Review and Critique," *American Law and Economics Association* 1, no. 1 (1999)
- Joseph Harrington, "Post-Cartel Pricing During Litigation," *Journal of Industrial Economics* 52, no. 4 (Dec. 2004)
- Justin McCrary and Daniel Rubinfeld, "Measuring Benchmark Damages in Antitrust Litigation," *Journal of Econometric Methods* 3, no. 1 (2014)
- Karen Blankfield, "JBS: The Story Behind the World's Biggest Meat Producer," *Forbes,* May 9, 2011, https://www.forbes.com/sites/kerenblankfeld/2011/04/21/jbs-the-story-behind-the-worlds-biggest-meat-producer/?sh=334ec6627e82
- Kimberly Hickok, "The United States's Corn Belt is making its own weather," *Science,* Feb. 16, 2018, https://www.science.org/content/article/america-s-corn-belt-making-its-own-weather
- Lacey Newlin, "So you want to build a slaughter plant?" *High Plains Journal,* June 12, 2020, https://www.hpj.com/livestock/so-you-want-to-build-a-slaughter-plant/article_a033a44e-acaf-11ea-a32d-63beecbd5f05.html
- Lee Schulz, "Estimated Returns - Swine: Farrow to Finish," *Iowa State University,* accessed Feb. 14, 2022, http://www2.econ.iastate.edu/estimated-returns/
- Lee Schulz, "Procedure for Estimating Returns: Farrow to Finish," *Iowa State University,* Jan. 2014, http://www2.econ.iastate.edu/estimated-returns/
- Lee Schulz, "Seasonal Hog Price Patterns," *Iowa State University,* accessed Apr. 11, 2022, https://www.extension.iastate.edu/agdm/livestock/html/b2-14.html
- Lucy Towers, "Pork Commentary: National Pork Industry Conference," *The Pig Site,* July 22, 2015, https://www.thepigsite.com/news/2015/07/pork-commentary-national-pork-industry-conference-1
- Mark Greenwood, "Costs Drop but Losses Continue," *National Hog Farmer,* Aug. 3, 2009, https://www.nationalhogfarmer.com/images/0903-costs-drop-losses-continue
- MarketScreener, "Smithfield Foods, Inc. completed the acquisition of Clougherty Packing, LLC, PFFJ, LLC and Champ, LLC from Hormel Foods Corporation," Jan. 3, 2017, https://www.marketscreener.com/quote/stock/HORMEL-FOODS-CORPORATION-12977/news/Smithfield-Foods-Inc-completed-the-acquisition-of-Clougherty-Packing-LLC-PFFJ-LLC-and-Champ-LL-35236577/
- Marvin Hayenga, "Cost Structures of Pork Slaughter and Processing Firms: Behavioral and Performance Implications," *Review of Agricultural Economics* 20, no. 2 (Autumn-Winter, 1998)
- Meat Poultry, "High hog production costs lead to loss at Smithfield," June 16, 2009, *available at* https://www.meatpoultry.com/articles/1056-high-hog-production-costs-lead-to-loss-at-smithfield
- Michael Corkery, David Yaffe-Bellany, Amelia Nierenberg and Quoctrung Bui, "There Is Plenty of Food in the Country," *New York Times,* Mar. 15, 2020, https://www.nytimes.com/2020/03/15/business/coronavirus-food-shortages.html

Appendix B: Materials Relied Upon

- Michael Hirtzer, "Hog Prices Hit Seven-Year Hihg on Grilling-Season Pork Demand," *Bloomberg,* May 21, 2021, *available at* https://www.bloomberg.com/news/articles/2021-05-21/grilling-season-demand-for-pork-has-hogs-at-seven-year-high
- Michael Langemeier, "Long-Term Trends In Pigs Per Litter," Purdue University Center for Commercial Agriculture, Feb. 5, 2021, https://ag.purdue.edu/commercialag/home/resource/2021/02/long-term-trends-in-pigs-per-litter-2/
- NAMI, "About NAMI," accessed Feb. 14, 2022, https://www.meatinstitute.org/index.php?ht=d/sp/i/204/pid/204
- NAMI, "History," accessed Feb. 14, 2022, https://www.meatinstitute.org/index.php?ht=d/sp/i/232/pid/232
- NAMI, "Home Page," accessed Feb. 14, 2022, https://www.meatinstitute.org/
- NAMI, "Product Search," accessed Feb. 14, 2022, https://members.meatinstitute.org/apps/#ProductSearch
- National Hog Farmer, "Recession May Help Pork Producers Survive," *National Hog Farmer,* Dec. 23, 2008, https://www.nationalhogfarmer.com/marketing/news/recession-helping-producers-1223
- National Hog Farmer, "Seaboard Triumph Foods recognized by Sioux City," *National Hog Farmer,* Oct. 19, 2018, https://www.nationalhogfarmer.com/business/seaboard-triumph-foods-recognized-sioux-city
- North American Meat Processors Association, "The Meat Buyer's Guide," *available at* https://www.thelivestockinstitute.org/uploads/4/9/9/2/49923305/meat-buyers-guide.pdf
- NPIC "About," accessed Apr. 9, 2022, https://porkconference.com/
- NPIC "Sponsors," accessed Apr. 9, 2022, https://porkconference.com/
- NPPC Annual Report 2007, *available at* https://nppc.org/wp-content/uploads/2016/01/CPR-2007-successes.pdf
- NPPC Annual Report 2011, *available at* https://nppc.org/wp-content/uploads/2016/01/CPR-2011-successes.pdf
- NPPC Annual Report 2015, *available at* https://nppc.org/wp-content/uploads/2016/01/CPR-2015-successes.pdf
- NPPC, "About Us," accessed Apr. 18, 2022, https://nppc.org/about-us/
- NPPC, "All About World Pork Expo," accessed Mar. 13, 2022, www.worldpork.org/all-about-expo/
- NPPC, "Board of Directors," accessed Apr. 18, 2022, https://nppc.org/about-us/staff/#board_of_directors
- NPPC, "GIPSA," accessed Mar. 18, 2022, https://nppc.org/issues/issue/gipsa/
- NPPC, "Home Page," accessed Feb. 15, 2022, https://nppc.org/
- NPPC, "Porkpac," accessed Apr. 18, 2022, https://nppc.org/programs/pork-pac/
- Peadar Lawlor and P Brendan Lynch, "A review of factors influencing litter size in Irish sows," *Irish Veterinary Journal* 60, no. 6 (2007)
- Peter Lammers et al., "Feed Budgets," *Iowa State University, available at* https://www.ipic.iastate.edu/publications/840.feedbudgets.pdf
- Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Aug. 9, 2017, *available at* https://www.porkcdn.com/sites/porkorg/library/2015/12/estimated_daily_u.s._slaughter_capacity_by_plant_hpd.pdf

Appendix B: Materials Relied Upon

- Pork Checkoff, "Estimated Daily U.S. Slaughter Capacity by Plant (head per day)," Sept. 17, 2018
- Pork Checkoff, "Pork Stats 2014," Nov. 21, 2014, *available at* https://texas4-h.tamu.edu/wp-content/uploads/Pork-Facts.pdf
- Pork Checkoff, "Quick Facts: The Pork Industry at a Glance," *available at* https://porkgateway.org/wp-content/uploads/2015/07/quick-facts-book1.pdf
- Pork Checkoff, "Life Cycle of a Market Pig." accessed Dec. 27, 2021, https://porkcheckoff.org/pork-branding/facts-statistics/life-cycle-of-a-market-pig/
- Pork Checkoff, "Top Eight Major Swine Breeds," accessed Apr. 13, 2022, https://porkcheckoff.org/pork-branding/facts-statistics/major-swine-breeds/
- Post Bulletin "NPPC Chooses New Leader," Feb. 27, 1997, https://www.postbulletin.com/nppc-chooses-new-leader
- Reuters, "Brazil's JBS concludes purchase of Cargill pork unit," *Reuters,* Oct. 30, 2015, https://www.reuters.com/article/us-jbs-m-a-cargill/brazils-jbs-concludes-purchase-of-cargill-pork-unit-idUSKCN0SO2OC20151030
- Richard Posner, *Antitrust Law,* 2nd ed. (Chicago, IL: University of Chicago Press, 2001)
- Rod Swoboda, "3 large pork processing plants coming online in Midwest in next 2 years," *Farm Progress,* June 27, 2016, https://www.farmprogress.com/story-3-large-pork-processing-plants-coming-online-midwest-next-2-years-25-142635
- Rogerio Jelmayer, "Brazil's JBS buys Swift Foods for $1.4 bln," *MarketWatch,* May 29, 2007, https://www.marketwatch.com/story/brazils-jbs-buys-swift-foods-for-14-bln
- Rogerio Jelmayer, "Brazilian Beef Producer JBS Agrees to Acquire Swift Foods," *Wall Street Journal,* May 29, 2007, https://www.wsj.com/articles/SB118044010182517037
- Ryan McCarthy and Sam Danley, "Map: COVID-19 Meat Plant Closures," Meat + Poultry, June 23, 2020, https://www.meatpoultry.com/articles/22993-covid-19-meat-plant-map.
- Samantha Padilla et al., "COVID-19 Working Paper: Changes in Regional Hog Slaughter During COVID-19," USDA, Paper #AP-095, Dec. 2021, https://www.ers.usda.gov/webdocs/publications/102784/ap-095.pdf?v=431.1
- Sarah Hepola, "Bacon Mania," *Salon,* July 7, 2008, https://www.salon.com/2008/07/07/bacon_mania/
- Sarah K. Linneen et al., "Swine Production," *Penn State College of Agricultural Sciences,* June 20, 2005, https://extension.psu.edu/swine-production
- Seaboard, "Cuts," accessed Dec. 2, 2021, https://seaboardfoods.com/Kitchen/Pages/Cuts.aspx
- Seaboard, "Facts and Figures," accessed Dec. 23, 2021, https://www.seaboardfoods.com/facts-figures/
- Seaboard, "Our Companies," accessed Dec. 23, 2021, https://seaboardtriumphfoods.com/about-us
- Seaboard, "Our Companies," accessed Dec. 23, 2021, https://seaboardtriumphfoods.com/our-story
- SEC, "Subsidiaries of the Registrant," accessed Apr. 9, 2022, https://www.sec.gov/Archives/edgar/data/91388/000119312508141434/dex21.htm
- SEC, "Tyson Foods, Inc. All Legal Operating Entities and Subsidiaries," accessed Feb. 14, 2022, https://www.sec.gov/Archives/edgar/data/100493/000010049303000064/exhibit_211.htm
- Shefali Sharma, "Companies: Dominating the Market from Farm to Display case," *Heinrich Boll Stiftung,* Sept. 7, 2021, https://eu.boell.org/en/2021/09/07/companies-dominating-market-farm-display-case

Appendix B: Materials Relied Upon

- Smithfield, "Know Your Cuts," accessed Apr. 22, 2022, https://smithfield.smithfieldfoods.com/en-us/articles/pork-101/know-your-cuts/
- Smithfield, "Know your cuts," accessed Dec. 2, 2021, https://smithfield.sfdbrands.com/en-us/articles/pork-101/know-your-cuts/
- Smithfield, "Our Brands," accessed Dec. 23, 2021, https://www.smithfieldfoods.com/our-brands
- South Dakota State University, "Three Million Pigs Possibly Lost Due to PEDV," *National Hog Farmer,* Jan. 6, 2014, https://www.nationalhogfarmer.com/health/three-million-pigs-possibly-lost-due-pedv
- Stephanie Strom, "Virus plagues the pork industry and environmentalists," *New York Times,* July 4, 2014, https://www.nytimes.com/2014/07/05/business/PEDv-plagues-the-pork-industry-and-environmentalists.html
- Steve R. Meyer and Barry Goodwin, "Structure and Importance of the U.S. Pork Industry," *available at* https://nppc.org/wp-content/uploads/2021/06/Competition_Paper_FINALWD.pdf
- STF, "Who We Are," accessed April 7, 2022, https://seaboardtriumphfoods.com/who-we-are
- SuperMarket News "Pork Council Names Tank to Top Post," Mar. 10, 1997, https://www.supermarketnews.com/archive/pork-council-names-tank-top-post
- The Free Library, "The value of livestock clubs," accessed Feb. 14, 2022, https://www.thefreelibrary.com/The+value+of+livestock+clubs.-a0253927538
- The Pig Site, "CME: Seasonal Patterns Determine Hog Production," Oct. 31, 2008, https://www.thepigsite.com/news/2008/10/cme-seasonal-patterns-determine-hog-production-1
- Timothy Wise and Sarah Trist, "Buyer Power in U.S. Hog Markets: A Critical Review of the Literature," Global Development and Environment Institute, Working Paper No. 10-04, Aug. 2010, https://ageconsearch.umn.edu/record/179085
- Triumph, "Triumph's Story," accessed Dec. 23, 2021, https://www.triumphfoods.com/triumphs-story/
- Tyson, "Hillshire Brands Former Shareholder Information," accessed Apr. 9, 2022, https://www.tysonfoods.com/hillshire-brands
- Tyson, "Our Brands," accessed Dec. 30, 2021, https://www.tysonfoods.com/our-brands
- Tyson, "Our History," accessed Dec. 30, 2021, https://www.tysonfoods.com/who-we-are/our-story/where-we-came-from/our-history
- Tyson, "Our Story," accessed Dec. 30, 2021, https://www.tysonfoods.com/who-we-are/our-story
- Tyson, "Tyson Foods Facts," accessed Dec. 30, 2021, https://ir.tyson.com/about-tyson/facts/default.aspx
- United States Department of Justice/United States Department of Agriculture Public Workshops Exploring Competition In Agriculture, Poultry Workshop, May 21, 2010
- USDA Economic Research Service, "Feed Grains Database," *available at* https://data.ers.usda.gov/FEED-GRAINS-custom-query.aspx
- USDA, "A User's Guide to USDA's LMR Pork Reports," 2018, https://www.ams.usda.gov/sites/default/files/media/LMRPorkPriceReportsHandout.pdf
- USDA, "Daily Direct Afternoon Hog Report," accessed Apr. 22, 2022, https://www.ams.usda.gov/mnreports/ams_2675.pdf
- USDA, "Swine Direct Reports," accessed Apr. 22, 2022, https://www.ams.usda.gov/market-news/swine-direct-reports
- USDA, "Corn Belt Region," accessed Mar. 4, 2022, https://agclass.nal.usda.gov/mtwdk.exe?k=glossary&l=60&w=3861&s=5&t=2

Appendix B: Materials Relied Upon

- USDA, "Farm Numbers," Dec. 24, 1980, *available at* https://downloads.usda.library.cornell.edu/usda-esmis/files/5712m6524/rv042w78n/zk51vk38j/FarmNumb-12-24-1980.pdf
- USDA, "Farms and Land in Farms, 2020 Summary," Feb. 2021, *available at* https://downloads.usda.library.cornell.edu/usda-esmis/files/5712m6524/tq57pj927/rx914h75j/fnlo0221.pdf
- USDA, "Fresh Pork from Farm to Table," Aug. 6, 2013, https://www.fsis.usda.gov/food-safety/safe-food-handling-and-preparation/meat/fresh-pork-farm-table
- USDA, "Livestock and Meat Domestic Data: All Meat Statistics: Historical," *available at* https://ers.usda.gov/data-products/livestock-and-meat-domestic-data/
- USDA, "Livestock and Meat Domestic Data: All supply and disappearance: Historical," *available at* https://ers.usda.gov/data-products/livestock-and-meat-domestic-data/
- USDA, "Livestock and Meat International Trade Data," *available at* https://www.ers.usda.gov/data-products/livestock-and-meat-international-trade-data/
- USDA, "Livestock Mandatory Reporting," 2018, https://www.ams.usda.gov/sites/default/files/media/LMR2018ReporttoCongress.pdf
- USDA, "Livestock Slaughter Annual Summary," *available at* https://usda.library.cornell.edu/concern/publications/r207tp32d
- USDA, "Porcine Epidemic Diarrhea Virus (PEDv) Summary of Actions," *available at* https://www.usda.gov/sites/default/files/documents/pedv-summary-actions.pdf
- USDA, "Quick Stats," *available at* https://quickstats.nass.usda.gov/AB538EEB-5AE6-3B3D-847F-6389CE507C06?long_desc__LIKE=#D624A5FC-58BD-3915-AABD-C17B7EA68974
- USDA, "Quick Stats," *available at* https://quickstats.nass.usda.gov/AB538EEB-5AE6-3B3D-847F-6389CE507C06?long_desc__LIKE=#D7C98566-B9BD-3176-841E-D8591DF72FDD
- USDA, "Sector at a Glance," USDA Economic Research Service, accessed July 30, 2021, https://www.ers.usda.gov/topics/animal-products/hogs-pork/sector-at-a-glance/
- USDA, "USDA Agricultural Projections to 2030," USDA Interagency Agricultural Projections Committee Long-Term Projections Report OCE-2021-1, Feb. 2021, *available at* https://www.ers.usda.gov/webdocs/outlooks/100526/oce-2021-1.pdf
- USDA, "What are the Cuts of Fresh Pork?" July 17, 2019, https://ask.usda.gov/s/article/What-are-the-cuts-of-fresh-pork
- USDOJ, Antitrust Division, "Herfindahl-Hirschman Index," USDOJ, July 31, 2018, https://www.justice.gov/atr/herfindahl-hirschman-index
- USDOJ, Antitrust Division, "Price Fixing, Bid Rigging, and Market Allocation Schemes: What They Are and What To Look For," Feb. 2021, https://www.justice.gov/atr/file/810261/download
- Virginian-Pilot, "Timeline | The history of Smithfield Foods," *Virginian-Pilot,* accessed Dec. 22, 2021, https://www.pilotonline.com/business/article_a2a34b25-aeb2-5d29-ab26-54094bb62bfd.html
- William Mcbride and Nigel Key, "Economic and Structural Relationships in U.S. Hog Production," USDA Agricultural Economic Report No. 818, Feb. 2003, https://www.ers.usda.gov/publications/pub-details/?pubid=41524
- World Atlas, "Corn Belt States," accessed Mar. 4, 2022, https://www.worldatlas.com/geography/corn-belt-united-states.html
- Zippia, "JBS USA Company History Timeline," accessed Feb. 9, 2022, https://www.zippia.com/jbs-usa-careers-28000/history/

Appendix B: Materials Relied Upon

Public Data

- BLS, Quarterly Census of Employment and Wages, QCEW Data Files, QCEW NAICS-Based Data Files (1975 - most recent), CSVs By Industry, Quarterly, 2004–2013, Industry 3116 Animal Slaughtering and Processing (https://www.bls.gov/cew/downloadable-data-files.htm)
- BLS, Relative importance of components in the Consumer Price Indexes: U.S. city average, Beef and veal, Pork, and Poultry (https://www.bls.gov/cpi/tables/relative-importance/home.htm)
- FRED, Consumer Price Index for All Urban Consumers: All Items in U.S. City Average, Index 1982-1984=100, Monthly, Seasonally Adjusted, CPIAUCSL (https://fred.stlouisfed.org/series/CPIAUCSL)
- FRED, Population, Thousands, Monthly, Not Seasonally Adjusted, POPTHM (https://fred.stlouisfed.org/series/POPTHM)
- FRED, Real Gross Domestic Product, Billions of Chained 2012 Dollars, Quarterly, Seasonally Adjusted Annual Rate, GDPC1 (https://fred.stlouisfed.org/series/GDPC1)
- Iowa State University, Estimated Livestock Returns, Estimated Returns - Swine, Farrow to Finish (http://www2.econ.iastate.edu/estimated-returns/Farrow to Finish Excel.xlsx)
- USDA, Feed Grains Custom Query (Corn, Prices received by farmers, Monthly, All years, Dollars per bushel, Corn grain, United States) (https://data.ers.usda.gov/FEED-GRAINS-custom-query.aspx)
- USDA, Feed Grains Custom Query (Oilseed meal feeds, Prices wholesale, Monthly, All years, Dollars per ton, Soybean meal, high protein, U.S. - Central IL) (https://data.ers.usda.gov/FEED-GRAINS-custom-query.aspx)
- USDA, Livestock and Meal International Trade Data, Annual and Cumulative Year-to-Date U.S. Livestock and Meat Trade by Country, Pork: annual and cumulative year-to-date U.S. trade (carcass weight, 1,000 pounds) (https://www.ers.usda.gov/data-products/livestock-and-meat-international-trade-data/) (https://www.ers.usda.gov/webdocs/DataFiles/81475/Pork_YearlyFull.xlsx?v=2599.1) (Pork_YearlyFull.xlsx)
- USDA, Livestock and Meat Domestic Data, All Meat Statistics, Meat statistics tables, historical (https://www.ers.usda.gov/data-products/livestock-and-meat-domestic-data/livestock-and-meat-domestic-data/) (https://www.ers.usda.gov/webdocs/DataFiles/51875/MeatStatsFull.xlsx?v=6055.4) (MeatStatsFull.xlsx)
- USDA, Livestock and Meat Domestic Data, All Supply and Disappearance, Meat supply and disappearance tables, historical, (https://www.ers.usda.gov/data-products/livestock-and-meat-domestic-data/livestock-and-meat-domestic-data/) (https://www.ers.usda.gov/webdocs/DataFiles/51875/MeatSDFull.xlsx?v=6055.4) (MeatSDFull.xlsx)
- USDA, Meat Price Spreads, Historical monthly price spread data for beef, pork, broilers (https://www.ers.usda.gov/data-products/meat-price-spreads/) (https://www.ers.usda.gov/webdocs/DataFiles/52160/history.xls?v=8903.3)
- USDA, Quick Stats, Survey, Animals & Products, Livestock, Hogs, Inventory, Hogs, Breeding - Inventory, Total, National, 2005–2019, Point in Time, First of Dec (https://quickstats.nass.usda.gov/)
- USDA, Quick Stats, Survey, Animals & Products, Livestock, Hogs, Litter Rate, Hogs - Litter Rate, measured in pigs / litter (https://quickstats.nass.usda.gov/)
- USITC, USITC DataWeb (https://dataweb.usitc.gov/trade/search/TotExp/SITC)

Defendant Data Questions & Responses

Agri Stats

- 2021 07 19 Cover Letter re Pork Production 06

Appendix B: Materials Relied Upon

- 2021 08 04 Cover Letter re Pork Production 07
- 2021 11 15 Letter from L. Phibbs to B. Pouya
- 2021 12 15 Cover Letter re Pork Production 09
- 2021 12 15 Letter from L. Phibbs to S. Scarlett
- 2022 01 03 Cover Letter re Pork Production 10

Clemens
- 2021.11.05 A. Bhattacharyya Ltr to B. Pouya re Clemens Data
- 2021-08-10 Production Ltr re CLMNS-013
- 2021-08-31 Production Ltr re CLMNS-018 (Final)
- 2022.03.04 Production Ltr re CLMNS-028

Hormel
- Hormel Foods.11-4 Letter re Structured Data

JBS
- 2021.11.02 JBS USA response to data questions - CONFIDENTIAL
- 20210901 JBS email re data

Seaboard
- 11.10.21 Responses to Sales Data Questions (final)
- Warr Data Letter
- Warr Offer of Non-Sales Data 6.25.21

Smithfield
- 2021.06.15 - Smithfield - Production Letter
- 2021.06.21 - Smithfield - Production Letter
- 2021.08.12 - Smithfield - Production Letter [Structured Data - SAP]
- 202100827 Smithfield letter
- 20210831 letter re Smithfield VOL006
- Smithfield - Response to Plaintiffs 10.8.21 Data Questions
- Smithfield - Revised Response to Plaintiffs 10.8.21 Data Questions (11.8.2021)
- Smithfield - Supplemental Response to Plaintiffs Structured Data Questions

Tyson
- 2021-06-19 B. Oppenheimer ltr re TF-P-011
- 2021-07-07 B. Oppenheimer ltr re TF-P-013
- 2021-07-13 B. Oppenheimer ltr re TF-P-015 (Structured Data)
- 2021-07-21 B. Oppenheimer ltr re TF-P-016 (Structured Data)
- 2021-08-19 B. Oppenheimer ltr re TF-P-023 (Structured Data)
- 2021-08-25 B.Oppenheimer ltr re TF-P-024 (Structured)
- 2021-09-01 B.Oppenheimer ltr re TF-P-027 (Structured)
- 2021-09-09 B. Oppenheimer ltr to Bobby Pouya re Tyson Pork Structured Data
- 2021-09-23 B. Oppenheimer ltr to Bobby Pouya re Tyson Pork Structured Data
- 2021-10-15 B. Oppenheimer ltr to Bobby Pouya re Tyson Pork Structured Data
- 2021-10-21 B. Oppenheimer ltr re TF-P-032 (Structured)
- 2021-12-30 B. Oppenheimer ltr to B. Pouya re TDW

Appendix B: Materials Relied Upon

Defendant Data on following pages

Appendix B: Materials Relied Upon

AGRI-STATS_AGRICODE	AGSTAT-P-0002836945	AGSTAT-P-0002836971	AGSTAT-P-0002836997
AGSTAT-P-0002836920	AGSTAT-P-0002836946	AGSTAT-P-0002836972	AGSTAT-P-0002836998
AGSTAT-P-0002836921	AGSTAT-P-0002836947	AGSTAT-P-0002836973	AGSTAT-P-0002836999
AGSTAT-P-0002836922	AGSTAT-P-0002836948	AGSTAT-P-0002836974	AGSTAT-P-0002837000
AGSTAT-P-0002836923	AGSTAT-P-0002836949	AGSTAT-P-0002836975	AGSTAT-P-0002837001
AGSTAT-P-0002836924	AGSTAT-P-0002836950	AGSTAT-P-0002836976	AGSTAT-P-0002837002
AGSTAT-P-0002836925	AGSTAT-P-0002836951	AGSTAT-P-0002836977	AGSTAT-P-0002837003
AGSTAT-P-0002836926	AGSTAT-P-0002836952	AGSTAT-P-0002836978	AGSTAT-P-0002837004
AGSTAT-P-0002836927	AGSTAT-P-0002836953	AGSTAT-P-0002836979	AGSTAT-P-0002837005
AGSTAT-P-0002836928	AGSTAT-P-0002836954	AGSTAT-P-0002836980	AGSTAT-P-0002837006
AGSTAT-P-0002836929	AGSTAT-P-0002836955	AGSTAT-P-0002836981	AGSTAT-P-0002837007
AGSTAT-P-0002836930	AGSTAT-P-0002836956	AGSTAT-P-0002836982	AGSTAT-P-0002837008
AGSTAT-P-0002836931	AGSTAT-P-0002836957	AGSTAT-P-0002836983	AGSTAT-P-0002837009
AGSTAT-P-0002836932	AGSTAT-P-0002836958	AGSTAT-P-0002836984	AGSTAT-P-0002837010
AGSTAT-P-0002836933	AGSTAT-P-0002836959	AGSTAT-P-0002836985	AGSTAT-P-0002837011
AGSTAT-P-0002836934	AGSTAT-P-0002836960	AGSTAT-P-0002836986	AGSTAT-P-0002837012
AGSTAT-P-0002836935	AGSTAT-P-0002836961	AGSTAT-P-0002836987	AGSTAT-P-0002837013
AGSTAT-P-0002836936	AGSTAT-P-0002836962	AGSTAT-P-0002836988	AGSTAT-P-0002837014
AGSTAT-P-0002836937	AGSTAT-P-0002836963	AGSTAT-P-0002836989	AGSTAT-P-0002837015
AGSTAT-P-0002836938	AGSTAT-P-0002836964	AGSTAT-P-0002836990	AGSTAT-P-0002837016
AGSTAT-P-0002836939	AGSTAT-P-0002836965	AGSTAT-P-0002836991	AGSTAT-P-0002837017
AGSTAT-P-0002836940	AGSTAT-P-0002836966	AGSTAT-P-0002836992	AGSTAT-P-0002837018
AGSTAT-P-0002836941	AGSTAT-P-0002836967	AGSTAT-P-0002836993	AGSTAT-P-0002837019
AGSTAT-P-0002836942	AGSTAT-P-0002836968	AGSTAT-P-0002836994	AGSTAT-P-0002837020
AGSTAT-P-0002836943	AGSTAT-P-0002836969	AGSTAT-P-0002836995	AGSTAT-P-0002837021
AGSTAT-P-0002836944	AGSTAT-P-0002836970	AGSTAT-P-0002836996	AGSTAT-P-0002837022

Appendix B: Materials Relied Upon

AGSTAT-P-0002837023	AGSTAT-P-0002837049	AGSTAT-P-0003457258	AGSTAT-P-0003457284
AGSTAT-P-0002837024	AGSTAT-P-0002837050	AGSTAT-P-0003457259	AGSTAT-P-0003457285
AGSTAT-P-0002837025	AGSTAT-P-0002837051	AGSTAT-P-0003457260	AGSTAT-P-0003457286
AGSTAT-P-0002837026	AGSTAT-P-0002837052	AGSTAT-P-0003457261	AGSTAT-P-0003457287
AGSTAT-P-0002837027	AGSTAT-P-0002837053	AGSTAT-P-0003457262	AGSTAT-P-0003457288
AGSTAT-P-0002837028	AGSTAT-P-0002837054	AGSTAT-P-0003457263	AGSTAT-P-0003457289
AGSTAT-P-0002837029	AGSTAT-P-0002837055	AGSTAT-P-0003457264	AGSTAT-P-0003457290
AGSTAT-P-0002837030	AGSTAT-P-0002837056	AGSTAT-P-0003457265	AGSTAT-P-0003457291
AGSTAT-P-0002837031	AGSTAT-P-0002837057	AGSTAT-P-0003457266	AGSTAT-P-0003457292
AGSTAT-P-0002837032	AGSTAT-P-0002837058	AGSTAT-P-0003457267	AGSTAT-P-0003457293
AGSTAT-P-0002837033	AGSTAT-P-0002837059	AGSTAT-P-0003457268	AGSTAT-P-0003457294
AGSTAT-P-0002837034	AGSTAT-P-0002837060	AGSTAT-P-0003457269	AGSTAT-P-0003457295
AGSTAT-P-0002837035	AGSTAT-P-0002837061	AGSTAT-P-0003457270	AGSTAT-P-0003457296
AGSTAT-P-0002837036	AGSTAT-P-0002837062	AGSTAT-P-0003457271	AGSTAT-P-0003457297
AGSTAT-P-0002837037	AGSTAT-P-0002837063	AGSTAT-P-0003457272	AGSTAT-P-0003457298
AGSTAT-P-0002837038	AGSTAT-P-0002837064	AGSTAT-P-0003457273	AGSTAT-P-0003457299
AGSTAT-P-0002837039	AGSTAT-P-0002837065	AGSTAT-P-0003457274	AGSTAT-P-0003457300
AGSTAT-P-0002837040	AGSTAT-P-0003457249	AGSTAT-P-0003457275	AGSTAT-P-0003457301
AGSTAT-P-0002837041	AGSTAT-P-0003457250	AGSTAT-P-0003457276	AGSTAT-P-0003457302
AGSTAT-P-0002837042	AGSTAT-P-0003457251	AGSTAT-P-0003457277	AGSTAT-P-0003457303
AGSTAT-P-0002837043	AGSTAT-P-0003457252	AGSTAT-P-0003457278	AGSTAT-P-0003457304
AGSTAT-P-0002837044	AGSTAT-P-0003457253	AGSTAT-P-0003457279	AGSTAT-P-0003457305
AGSTAT-P-0002837045	AGSTAT-P-0003457254	AGSTAT-P-0003457280	AGSTAT-P-0003457306
AGSTAT-P-0002837046	AGSTAT-P-0003457255	AGSTAT-P-0003457281	AGSTAT-P-0003457307
AGSTAT-P-0002837047	AGSTAT-P-0003457256	AGSTAT-P-0003457282	AGSTAT-P-0003457308
AGSTAT-P-0002837048	AGSTAT-P-0003457257	AGSTAT-P-0003457283	AGSTAT-P-0003457309

Appendix B: Materials Relied Upon

AGSTAT-P-0003457310	AGSTAT-P-0003457336	CLMNS-0000496550	CLMNS-0000496576
AGSTAT-P-0003457311	AGSTAT-P-0003457337	CLMNS-0000496551	CLMNS-0000496577
AGSTAT-P-0003457312	AGSTAT-P-0003457338	CLMNS-0000496552	CLMNS-0000496578
AGSTAT-P-0003457313	AGSTAT-P-0003457339	CLMNS-0000496553	CLMNS-0000496579
AGSTAT-P-0003457314	AGSTAT-P-0003457340	CLMNS-0000496554	CLMNS-0000496580
AGSTAT-P-0003457315	AGSTAT-P-0003457341	CLMNS-0000496555	CLMNS-0000496581
AGSTAT-P-0003457316	AGSTAT-P-0003457342	CLMNS-0000496556	CLMNS-0000496582
AGSTAT-P-0003457317	AGSTAT-P-0003457343	CLMNS-0000496557	CLMNS-0000496583
AGSTAT-P-0003457318	AGSTAT-P-0003457344	CLMNS-0000496558	CLMNS-0000496584
AGSTAT-P-0003457319	AGSTAT-P-0003457345	CLMNS-0000496559	CLMNS-0000496585
AGSTAT-P-0003457320	AGSTAT-P-0003457346	CLMNS-0000496560	CLMNS-0000496586
AGSTAT-P-0003457321	AGSTAT-P-0003457347	CLMNS-0000496561	CLMNS-0000496587
AGSTAT-P-0003457322	AGSTAT-P-0003457348	CLMNS-0000496562	CLMNS-0000496588
AGSTAT-P-0003457323	AGSTAT-P-0003457349	CLMNS-0000496563	CLMNS-0000496589
AGSTAT-P-0003457324	AGSTAT-P-0003457350	CLMNS-0000496564	CLMNS-0000496590
AGSTAT-P-0003457325	AGSTAT-P-0003457351	CLMNS-0000496565	CLMNS-0000496591
AGSTAT-P-0003457326	AGSTAT-P-0003457352	CLMNS-0000496566	CLMNS-0000496592
AGSTAT-P-0003457327	AGSTAT-P-0003457353	CLMNS-0000496567	CLMNS-0000496593
AGSTAT-P-0003457328	AGSTAT-P-0003457354	CLMNS-0000496568	CLMNS-0000496594
AGSTAT-P-0003457329	AGSTAT-P-0003457355	CLMNS-0000496569	CLMNS-0000496595
AGSTAT-P-0003457330	AGSTAT-P-0003457356	CLMNS-0000496570	CLMNS-0000496596
AGSTAT-P-0003457331	AGSTAT-P-0003457357	CLMNS-0000496571	CLMNS-0000496597
AGSTAT-P-0003457332	AGSTAT-P-0003457358	CLMNS-0000496572	CLMNS-0000496598
AGSTAT-P-0003457333	AGSTAT-P-0003457359	CLMNS-0000496573	CLMNS-0000496599
AGSTAT-P-0003457334	AGSTAT-P-0003457360	CLMNS-0000496574	CLMNS-0000496600
AGSTAT-P-0003457335	AGSTAT-P-0003457361	CLMNS-0000496575	CLMNS-0000496601

Appendix B: Materials Relied Upon

CLMNS-0000496602
CLMNS-0000496603
CLMNS-0000496604
CLMNS-0000496605
CLMNS-0000496606
CLMNS-0000496607
CLMNS-0000496608
CLMNS-0000496609
CLMNS-0000496610
CLMNS-0000496611
CLMNS-0000496612
CLMNS-0000496613
CLMNS-0000496614
CLMNS-0000496615
CLMNS-0000496616
CLMNS-0000496617
CLMNS-0000496618
CLMNS-0000496619
CLMNS-0000496620
CLMNS-0000496621
CLMNS-0000496622
CLMNS-0000496623
CLMNS-0000496624
CLMNS-0000496625
CLMNS-0000496626
CLMNS-0000496627
CLMNS-0000496628
CLMNS-0000496629
CLMNS-0000496630
CLMNS-0000496631
CLMNS-0000496632
CLMNS-0000496633
CLMNS-0000496634
CLMNS-0000496635
CLMNS-0000496636
CLMNS-0000496637
CLMNS-0000496638
CLMNS-0000496639
CLMNS-0000496640
CLMNS-0000496641
CLMNS-0000496642
CLMNS-0000496643
CLMNS-0000496644
CLMNS-0000496645
CLMNS-0000496646
CLMNS-0000496647
CLMNS-0000496648
CLMNS-0000496649
CLMNS-0000496650
CLMNS-0000496651
CLMNS-0000496652
CLMNS-0000496653
CLMNS-0000496654
CLMNS-0000496655
CLMNS-0000496656
CLMNS-0000496657
CLMNS-0000496658
CLMNS-0000496659
CLMNS-0000496660
CLMNS-0000496661
CLMNS-0000496662
CLMNS-0000496663
CLMNS-0000496664
CLMNS-0000496665
CLMNS-0000496666
CLMNS-0000496667
CLMNS-0000496668
CLMNS-0000496669
CLMNS-0000496670
CLMNS-0000496671
CLMNS-0000496672
CLMNS-0000496673
CLMNS-0000496674
CLMNS-0000496675
CLMNS-0000496676
CLMNS-0000496677
CLMNS-0000496678
CLMNS-0000496679
CLMNS-0000496680
CLMNS-0000496681
CLMNS-0000496682
CLMNS-0000496683
CLMNS-0000496684
CLMNS-0000496685
CLMNS-0000496686
CLMNS-0000496687
CLMNS-0000496688
CLMNS-0000496689
CLMNS-0000496690
CLMNS-0000496691
CLMNS-0000496692
CLMNS-0000496693
CLMNS-0000496694
CLMNS-0000496695
CLMNS-0000496696
CLMNS-0000496697
CLMNS-0000496698
CLMNS-0000496699
CLMNS-0000496700
CLMNS-0000496701
CLMNS-0000496702
CLMNS-0000496703
CLMNS-0000496704
CLMNS-0000496705

Appendix B: Materials Relied Upon

CLMNS-0000496706	CLMNS-0000496732	CLMNS-0000496758	CLMNS-0000496784
CLMNS-0000496707	CLMNS-0000496733	CLMNS-0000496759	CLMNS-0000496785
CLMNS-0000496708	CLMNS-0000496734	CLMNS-0000496760	CLMNS-0000496786
CLMNS-0000496709	CLMNS-0000496735	CLMNS-0000496761	CLMNS-0000496787
CLMNS-0000496710	CLMNS-0000496736	CLMNS-0000496762	CLMNS-0000496788
CLMNS-0000496711	CLMNS-0000496737	CLMNS-0000496763	CLMNS-0000496789
CLMNS-0000496712	CLMNS-0000496738	CLMNS-0000496764	CLMNS-0000496790
CLMNS-0000496713	CLMNS-0000496739	CLMNS-0000496765	CLMNS-0000496791
CLMNS-0000496714	CLMNS-0000496740	CLMNS-0000496766	CLMNS-0000496792
CLMNS-0000496715	CLMNS-0000496741	CLMNS-0000496767	CLMNS-0000496793
CLMNS-0000496716	CLMNS-0000496742	CLMNS-0000496768	CLMNS-0000496794
CLMNS-0000496717	CLMNS-0000496743	CLMNS-0000496769	CLMNS-0000496795
CLMNS-0000496718	CLMNS-0000496744	CLMNS-0000496770	CLMNS-0000496796
CLMNS-0000496719	CLMNS-0000496745	CLMNS-0000496771	CLMNS-0000496797
CLMNS-0000496720	CLMNS-0000496746	CLMNS-0000496772	CLMNS-0000496798
CLMNS-0000496721	CLMNS-0000496747	CLMNS-0000496773	CLMNS-0000496799
CLMNS-0000496722	CLMNS-0000496748	CLMNS-0000496774	CLMNS-0000496800
CLMNS-0000496723	CLMNS-0000496749	CLMNS-0000496775	CLMNS-0000496801
CLMNS-0000496724	CLMNS-0000496750	CLMNS-0000496776	CLMNS-0000496802
CLMNS-0000496725	CLMNS-0000496751	CLMNS-0000496777	CLMNS-0000496803
CLMNS-0000496726	CLMNS-0000496752	CLMNS-0000496778	CLMNS-0000496804
CLMNS-0000496727	CLMNS-0000496753	CLMNS-0000496779	CLMNS-0000496805
CLMNS-0000496728	CLMNS-0000496754	CLMNS-0000496780	CLMNS-0000496806
CLMNS-0000496729	CLMNS-0000496755	CLMNS-0000496781	CLMNS-0000496807
CLMNS-0000496730	CLMNS-0000496756	CLMNS-0000496782	CLMNS-0000496808
CLMNS-0000496731	CLMNS-0000496757	CLMNS-0000496783	CLMNS-0000496809

Appendix B: Materials Relied Upon

CLMNS-0000496810
CLMNS-0000496811
CLMNS-0000496812
CLMNS-0000496813
CLMNS-0000496814
CLMNS-0000496815
CLMNS-0000496816
CLMNS-0000496817
CLMNS-0000496818
CLMNS-0000496819
CLMNS-0000496820
CLMNS-0000496821
CLMNS-0000496822
CLMNS-0000496823
CLMNS-0000496824
CLMNS-0000496825
CLMNS-0000496826
CLMNS-0000496827
CLMNS-0000496828
CLMNS-0000584728
CLMNS-0000584729
CLMNS-0000584730
CLMNS-0000584731
CLMNS-0000584732
CLMNS-0000584733
CLMNS-0000584734
CLMNS-0000584735
CLMNS-0000584736
CLMNS-0000584737
CLMNS-0000584738
CLMNS-0000584739
CLMNS-0000704964
CLMNS-0000704965
CLMNS-0000704966
CLMNS-0000704967
CLMNS-0000704968
CLMNS-0000704969
CLMNS-0000704970
CLMNS-0000704971
CLMNS-0000704972
CLMNS-0000704973
CLMNS-0000704974
CLMNS-0000704975
CLMNS-0000704976
CLMNS-0000704977
CLMNS-0000704978
CLMNS-0000704979
CLMNS-0000704980
CLMNS-0000704981
CLMNS-0000704982
CLMNS-0000704983
CLMNS-0000704984
CLMNS-0000704985
CLMNS-0000704986
CLMNS-0000704987
CLMNS-0000704988
CLMNS-0000704989
CLMNS-0000704990
CLMNS-0000704991
CLMNS-0000704992
CLMNS-0000704993
CLMNS-0000704994
CLMNS-0000704995
CLMNS-0000704996
CLMNS-0000704997
CLMNS-0000704998
CLMNS-0000704999
CLMNS-0000705000
CLMNS-0000705001
CLMNS-0000705002
CLMNS-0000705003
CLMNS-0000705004
CLMNS-0000705005
CLMNS-0000705006
CLMNS-0000705007
CLMNS-0000705008
CLMNS-0000705009
CLMNS-0000705010
CLMNS-0000705011
CLMNS-0000705012
CLMNS-0000705013
CLMNS-0000705014
CLMNS-0000705015
CLMNS-0000705016
CLMNS-0000705017
CLMNS-0000705018
CLMNS-0000705019
CLMNS-0000705020
CLMNS-0000705021
CLMNS-0000705022
CLMNS-0000705023
CLMNS-0000705024
CLMNS-0000705025
CLMNS-0000705026
CLMNS-0000705027
CLMNS-0000705028
COMMODITY
DIVISION
HFC-PORKAT0000258483
HFC-PORKAT0000258484
HFC-PORKAT0000258485
HFC-PORKAT0000258486
HFC-PORKAT0000258487
HFC-PORKAT0000258488

Appendix B: Materials Relied Upon

HFC-PORKAT0000258489
HFC-PORKAT0000258490
HFC-PORKAT0000258491
HFC-PORKAT0000258492
HFC-PORKAT0000258493
HFC-PORKAT0000258494
HFC-PORKAT0000258495
HFC-PORKAT0000258496
HFC-PORKAT0000258497
HFC-PORKAT0000258498
HFC-PORKAT0000258499
Hormel Fiscal Date Table
JBS-PORK-SD-00000001
JBS-PORK-SD-00000002
JBS-PORK-SD-00000003
JBS-PORK-SD-00000004
JBS-PORK-SD-00000005
JBS-PORK-SD-00000006
JBS-PORK-SD-00000007
JBS-PORK-SD-00000008
JBS-PORK-SD-00000009
JBS-PORK-SD-00000010
JBS-PORK-SD-00000011
JBS-PORK-SD-0000012
JBS-PORK-SD-0000013
JBS-PORK-SD-0000014
SeaboardLookupTable0002 (Sales)
SeaboardSD_0001
SeaboardSD_0002
SMITHFIELD_SD_000001
SMITHFIELD_SD_000002
SMITHFIELD_SD_000003
SMITHFIELD_SD_000004
SMITHFIELD_SD_000013
SMITHFIELD_SD_000014
SMITHFIELD_SD_000015
SMITHFIELD_SD_000016
SMITHFIELD_SD_000017
SMITHFIELD_SD_000018
SMITHFIELD_SD_000019
SMITHFIELD_SD_000020
SMITHFIELD_SD_000021
SMITHFIELD_SD_000022
SMITHFIELD_SD_000023
SMITHFIELD_SD_000024
SMITHFIELD_SD_000025
SMITHFIELD_SD_000026
SMITHFIELD_SD_000027
SMITHFIELD_SD_000028
SMITHFIELD_SD_000029
SMITHFIELD_SD_000030
SMITHFIELD_SD_000031
SMITHFIELD_SD_000032
SMITHFIELD_SD_000033
SMITHFIELD_SD_000034
SMITHFIELD_SD_000035
SMITHFIELD_SD_000036
SMITHFIELD_SD_000037
SMITHFIELD_SD_000038
SMITHFIELD_SD_000051
SMITHFIELD_SD_000052
SMITHFIELD_SD_000053
SMITHFIELD_SD_000054
SMITHFIELD_SD_000055
SMITHFIELD_SD_000056
SMITHFIELD_SD_000057
SMITHFIELD_SD_000058
SMITHFIELD_SD_000059
SMITHFIELD_SD_000060
SMITHFIELD_SD_000061
SMITHFIELD_SD_000062
SMITHFIELD_SD_000063
SMITHFIELD_SD_000064
SMITHFIELD_SD_000065
SMITHFIELD_SD_000067
SMITHFIELD_SD_000068
SMITHFIELD_SD_000069
SMITHFIELD_SD_000070
SMITHFIELD_SD_000071
SMITHFIELD_SD_000072
SMITHFIELD_SD_000073
SMITHFIELD_SD_000074
SMITHFIELD_SD_000075
SMITHFIELD_SD_000076
SMITHFIELD_SD_000077
SMITHFIELD_SD_000078
SMITHFIELD_SD_000079
SMITHFIELD_SD_000080
SMITHFIELD_SD_000081
SMITHFIELD_SD_000082
SMITHFIELD_SD_000083
SMITHFIELD_SD_000084
SMITHFIELD_SD_000085
SMITHFIELD_SD_000086
SMITHFIELD_SD_000087
SMITHFIELD_SD_000088
SMITHFIELD_SD_000089
SMITHFIELD_SD_000090
SMITHFIELD_SD_000091
SMITHFIELD_SD_000092
SMITHFIELD_SD_000093
SMITHFIELD_SD_000094
SMITHFIELD_SD_000095
SMITHFIELD_SD_000096

Appendix B: Materials Relied Upon

SMITHFIELD_SD_000097
SMITHFIELD_SD_000098
SMITHFIELD_SD_000099
SMITHFIELD_SD_000100
SMITHFIELD_SD_000101
SMITHFIELD_SD_000102
SMITHFIELD_SD_000103
SMITHFIELD_SD_000104
SMITHFIELD_SD_000105
SMITHFIELD_SD_000106
SMITHFIELD_SD_000107
SMITHFIELD_SD_000108
SMITHFIELD_SD_000139
SMITHFIELD_SD_000140
SMITHFIELD_SD_000141
SMITHFIELD_SD_000142
SMITHFIELD_SD_000143
SMITHFIELD_SD_000144
SMITHFIELD_SD_000145
SMITHFIELD_SD_000146
SMITHFIELD_SD_000147
SMITHFIELD_SD_000148
SMITHFIELD_SD_000149
SMITHFIELD_SD_000150
SMITHFIELD_SD_000151
TF-P-000779164
TF-P-000779165
TF-P-000779166
TF-P-000779167
TF-P-000779168
TF-P-000779169
TF-P-000779170
TF-P-000779171
TF-P-000779172
TF-P-000779173
TF-P-000779174
TF-P-000779175
TF-P-000779176
TF-P-000779177
TF-P-000779178
TF-P-000779179
TF-P-000779180
TF-P-000779181
TF-P-000779182
TF-P-000779183
TF-P-000779184
TF-P-000779185
TF-P-000779186
TF-P-000779187
TF-P-002250081
TF-P-002250082
TF-P-002250083
TF-P-002250084
TF-P-002250085
TF-P-002250086
TF-P-002250087
TF-P-002250088
TF-P-002250089
TF-P-002250090
TF-P-002250091
TF-P-002250092
TF-P-002250093
TF-P-002250094
TF-P-002250095
TF-P-002250096
TF-P-002250097
TF-P-002313047
TF-P-002313048
TF-P-002313049
TF-P-002313050
TF-P-002313051
TF-P-002316638
TF-P-002316640
TF-P-002316641
TF-P-002316642
TF-P-002316643
TF-P-002316644
TF-P-002316645
TF-P-002316646
TF-P-002316647
TF-P-002316648
TF-P-002316649
TF-P-002316650

Appendix B: Materials Relied Upon

Bates Documents on following pages

Appendix B: Materials Relied Upon

21CFORUM-0000003142
21CFORUM-0000005084
21CFORUM-0000036095
AGSTAT-P-0000000446
AGSTAT-P-0002615248
AGSTAT-P-0002621966
AGSTAT-P-0002793877
AGSTAT-P-0002793886
AGSTAT-P-0002794244
AGSTAT-P-0002802266
AGSTAT-P-0002816810
AGSTAT-P-0002866994
AGSTAT-P-0002866995
AGSTAT-P-0003379897
AGSTAT-P-0003380282
AGSTAT-P-0003380399
AGSTAT-P-0003384656
AGSTAT-P-0003407944
AGSTAT-P-0003407946
AGSTAT-P-0003424595
AGSTAT-P-0003475975
CLMNS-0000023183
CLMNS-0000030030
CLMNS-0000030331
CLMNS-0000031669
CLMNS-0000032665
CLMNS-0000033028
CLMNS-0000036455
CLMNS-0000036566
CLMNS-0000057028
CLMNS-0000060956
CLMNS-0000078000
CLMNS-0000081280
CLMNS-0000169100
CLMNS-0000333109
CLMNS-0000519436
CLMNS-0000531090
CLMNS-0000602477
CLMNS-0000615407
CLMNS-0000670325
CLMNS-0000704908
DPP-Pork0000006903
HFC-PORKAT0000010490
HFC-PORKAT0000016637
HFC-PORKAT0000017293
HFC-PORKAT0000017294
HFC-PORKAT0000017883
HFC-PORKAT0000022976
HFC-PORKAT0000022978
HFC-PORKAT0000024106
HFC-PORKAT0000030322
HFC-PORKAT0000031666
HFC-PORKAT0000032970
HFC-PORKAT0000033928
HFC-PORKAT0000043004
HFC-PORKAT0000046252
HFC-PORKAT0000046909
HFC-PORKAT0000047054
HFC-PORKAT0000047101
HFC-PORKAT0000047285
HFC-PORKAT0000047424
HFC-PORKAT0000048877
HFC-PORKAT0000064495
HFC-PORKAT0000079838
HFC-PORKAT0000081625
HFC-PORKAT0000098220
HFC-PORKAT0000150825
HFC-PORKAT0000201650
HFC-PORKAT0000272375
HFC-PORKAT0000291060
HFC-PORKAT0000313651
HFC-PORKAT0000359723
HFC-PORKAT0000373007
HFC-PORKAT0000373554
HFC-PORKAT0000380014
JBS-PORK-00010573
JBS-PORK-00035611
JBS-PORK-00117156
JBS-PORK-00220315
JBS-PORK-00220552
JBS-PORK-00220947
JBS-PORK-00229571
JBS-PORK-00250181
JBS-PORK-00309581
JBS-PORK-00340686
JBS-PORK-00519042
JBS-PORK-00541999
JBS-PORK-00542703
JBS-PORK-00637633
JBS-PORK-00644151
JBS-PORK-00644153
JBS-PORK-00644214
JBS-PORK-00673114
JBS-PORK-00673115
JBS-PORK-00734266
JBS-PORK-00740841
JBS-PORK-00746397
JBS-PORK-00781085
JBS-PORK-00787974
JBS-PORK-01018789
JBS-PORK-01030277
JBS-PORK-01030303
JBS-PORK-01078924
JBS-PORK-01089651
JBS-PORK-01264697
JBS-PORK-01774969
JBS-PORK-01945214
JBS-PORK-01992804
NPPC0000017781
NPPC0000030457
NPPC0000052170
NPPC0000054737

Appendix B: Materials Relied Upon

NPPC0000058889
NPPC0000060474
NPPC0000076623
NPPC0000112014
NPPC0000112015
NPPC0000153516
NPPC0000159023
NPPC0000159025
NPPC0000179800
NPPC0000183010
PFI00001089
PFI00001270
PFI00001310
PFI00003105
PFI00005090
PFI00005331
PFI00005708
PFI00019191
PFI00019199
PFI00019223
PFI00019264
SBF0054466
SBF0059854
SBF0062030
SBF0145794
SBF0184228
SBF0184229
SBF0208411
SBF0258716
SBF0312981
SBF0321017
SBF0342160
SBF0342619
SBF0350406
SBF0350830
SBF0459029
SBF0459030
SBF0542598
SBF0566539
SBF0574001
SBF0612244
SBF0727646
SBF0727647
SBF1096303
SBF1100617
SeaboardSD0009
SMITHFIELD_SD_000119
SMITHFIELD_SD_000120
SMITHFIELD00302315
SMITHFIELD00371676
SMITHFIELD00536957
SMITHFIELD00536985
SMITHFIELD00536986
SMITHFIELD00651440
SMITHFIELD00715331
SMITHFIELD00745502
SMITHFIELD00752421
SMITHFIELD00828433
SMITHFIELD00829448
SMITHFIELD00872455
SMITHFIELD00898317
SMITHFIELD00905745
SMITHFIELD00908213
SMITHFIELD00918546
SMITHFIELD01003515
SMITHFIELD01007101
SMITHFIELD01046455
SMITHFIELD01074263
SMITHFIELD01121927
SMITHFIELD01144316
SMITHFIELD01199959
SMITHFIELD01240655
SMITHFIELD01285587
SMITHFIELD01463924
SMITHFIELD01989181
SMITHFIELD02138221
SMITHFIELD03005050
SMITHFIELD03619652
SMITHFIELD03631355
SMITHFIELD03766368
SMITHFIELD03867890
SMITHFIELD03935321
SMITHFIELD04154722
SMITHFIELD04156577
SMITHFIELD04516433
SMITHFIELD04516494
SMITHFIELD04771010
SMITHFIELD04848737
TF-P-000013975
TF-P-000021759
TF-P-000051402
TF-P-000082554
TF-P-000091817
TF-P-000097445
TF-P-000103885
TF-P-000134191
TF-P-000169041
TF-P-000232490
TF-P-000259232
TF-P-000304468
TF-P-000306268
TF-P-000306676
TF-P-000318789
TF-P-000374875
TF-P-000495385
TF-P-000518663
TF-P-000521398
TF-P-000525375
TF-P-000538548
TF-P-000578082
TF-P-000639648
TF-P-000641835

Appendix B: Materials Relied Upon

TF-P-000665127
TF-P-000682020
TF-P-000800928
TF-P-000924349
TF-P-000981896
TF-P-000983067
TF-P-001122856
TF-P-001193285
TF-P-001289149
TF-P-001381827
TF-P-001385600
TF-P-001411152
TF-P-001509009
TF-P-001528551
TF-P-001578110
TF-P-001581446
TF-P-001584668
TF-P-001584677
TF-P-001615446
TF-P-001618946
TF-P-001633705
TF-P-001707716
TF-P-001718524
TF-P-001719899
TF-P-001733775
TF-P-001744505
TF-P-001791677
TF-P-001807247
TF-P-001807251
TF-P-001871227
TF-P-001889329
TF-P-001889330
TF-P-001985817
TF-P-002021785
TF-P-002030919
TF-P-002250098
TF-P-002251273
TF-P-002252585
TF-P-002253012
TF-P-002262972
TF-P-002264639
TF-P-002358138
TF-P-002407277
TF-P-002455139
TRI0000031946
TRI0000045525
TRI0000049789
TRI0000085202
TRI0000095314
TRI0000097674
TRI0000102311
TRI0000103360
TRI0000103609
TRI0000108888
TRI0000335034
TRI0000335035
TRI0000335037
TRI0000387004
TRI0000390682
TRI0000419868
TRI0000419871
TRI0000433907
TRI0000433947
TRI0000479701
TRI0000481594
TRI0000481873